VOL. XXXVIII, No. 2, 1955

EXD

THE

MALAYAN AGRICULTURAL JOURNAL

IMONWEALTH INST.
OMOLOGY LIBRARY
12 SEP 1955
IAL As 17
PARATE

PRINCIPAL CONTENTS

THE CULTIVATION OF FODDER GRASSES IN MALAYA.
PART I. INTRODUCTION BY R. HENDERSON, M.C., B.Sc.

THE INHERITANCE AND FRAGMENTATION OF MALAY PADI LANDS IN KRIAN, PERAK, BY T. B. WILSON, B.A. (OXON), DIP. AGRIC. ECON., D.T.A.

THE USE OF VENEER TUBES FOR RAISING CACAO SEEDLINGS BY E. F. ALLEN, B.A., DIP. AGR. SCI. (CAMB.), A.I.C.T.A. AND C. WHITEHEAD, B.Sc. (HORT.), D.T.A.

NOTES ON CURRENT INVESTIGATIONS, JANUARY TO MARCH, 1955.

MECHANISATION. HALF-YEARLY REPORT, OCTOBER, 1954, TO MARCH, 1955.

NOTES ON EXTENSION WORK, JANUARY TO MARCH, 1955.

DEPARTMENT OF AGRICULTURE, FEDERATION OF MALAYA.
Kuala Lumpur.
PRICE $2

DEPARTMENT OF AGRICULTURE, FEDERATION OF MALAYA.

ORGANIZATION (as at 30th April, 1955).

Director of Agriculture:—O. J. Voelcker, C.B.E., M.A., A.I.C.T.A. (*On leave*).
R. G. Heath (*Acting*).

Deputy Director of Agriculture:—R. G. Heath, B.Sc. (Agr.), A.I.C.T.A.
J. Cook (*Acting*).

Administrative Officer:—H. F. Logan.

Office Assistant:—Low Kim Ann.

Financial Assistant:—V. Sundram.

RESEARCH BRANCH.

Chief Research Officer:—

R. B. Jagoe, B.Sc. (Hons.).

(II) BOTANY.

Senior Botanist:—

L. N. H. Larter, B.Sc. (Hons.), A.R.C.S., A.I.C.T.A.

Plant Breeders:—

F. B. Brown, B.Sc. (Hons.), Dip. Agr. Sci. (Camb.).

A. V. Haddon, B.Sc. (Hons.), Dip. Agr. Sci. (Camb.).

Chew Hong Jung, B.Sc. (Hons.), B. Agric.

Van Thean Kee, B.Sc. (Hons.).

*W. F. Grant, M.A., Ph.D.

One vacancy.

Plant Physiologists:—

J. Dore, B.Sc. (Hons.), Ph.D., A.R.C.S.

*R. G. Lockard, B.S.A., M.Sc. (Agric.).

Asst. Research Officer:—

Tak bin Haji Daud.

(III) CHEMISTRY.

Senior Chemist:—

A. E. Billington, M.A., A.R.I.C.

Canning Officer:—

F. N. G. Conaty, B.Sc., A.R.I.C.

Chemists:—

Miss M. Smith, B.Sc. (*Temporary*).

Two vacancies.

Assistant Chemist:—

K. Kanapathy, B.Sc. (Hons.) (Madras).
(*At present on Scholarship Course*).

Kao Wei Tsan, B.Sc. (Lingnan).

(IV) SOIL SCIENCE.

Senior Chemist (Soils):—(*Vacant*).

J. K. Coulter. (*Acting*).

FIELD BRANCH.

Chief Field Officer:—

J. R. Curry, Dip. Agr. Sci. (Dunelm), N.D.A. (*On leave*).

P. G. Coleman, M.A., A.I.C.T.A. (*Acting*).

Agricultural Economist:—

T. B. Wilson, B.A. (Oxon), Dip. Agric. Econ., D.T.A.

Personal Assistant to Chief Field Officer:—

Yoon Weng Kong. (*On leave*).

C. Ratnam. (*Acting*).

KEDAH & PERLIS: *State Agricultural Officer (Kedah and Perlis)*:—

E. J. H. Berwick, M.A., Dip. Agric. Sci. (Camb.), A.I.C.T.A.

Agricultural Officer:—

M. G. Hawson, B.Sc. (Agric.), D.T.A.

Asst. Agricultural Officers:—

Hj. Mohd. Salleh bin Musa.

Salim bin Mhd. Akib.

Abdul Hamid bin Haji Hussain (*Perlis*).

KELANTAN: *State Agricultural Officer*:—

R. Henderson, M.C., B.Sc. (*Acting*).

Asst. Agricultural Officer:—

Hj. Mahmud bin Haji Yaacob.

TRENGGANU: *State Agricultural Officer*:—

A. L. Barcroft, B.Sc.

Asst. Agricultural Officer:—(*Vacant*).

PENANG & PROVINCE WELLESLEY: *Settlement Agricultural Officer*:—

J. R. Milburn, B.Sc. (Dunelm), D.T.A.

Asst. Agricultural Officer:—

Mohd. Noordin bin Mohd. Kassim.

PERAK: *State Agricultural Officer*:—

W. N. Scott, B.Sc., B. Agr., Ph.D., D.I.C.

Agricultural Officer:—

Perak North—Ahmad bin Mhd Amin, B.Sc. (Agric.).

* Supernumerary appointments under the Colombo Plan.

(*Continued*)

ERRATUM

Malayan Agricultural Journal, Vol. XXXVII, No. 4.

Page 209, para. 3, line 7:

for "two ounces" read "half an ounce".

THE

Malayan Agricultural Journal

Edited by the Publications Officer with the assistance of
The Publications Committee.

Vol. XXXVIII No. 2, 1955.

EDITORIAL 69

ORIGINAL ARTICLES.

THE CULTIVATION OF FODDER GRASSES IN MALAYA. PART I. INTRODUCTION BY R. HENDERSON, M.C., B.SC. 71

THE INHERITANCE AND FRAGMENTATION OF MALAY PADI LANDS IN KRIAN, PERAK, BY T. B. WILSON, B.A. (OXON), DIP. AGRIC. ECON., D.T.A. 78

THE USE OF VENEER TUBES FOR RAISING CACAO SEEDLINGS BY E. F. ALLEN, B.A., DIP. AGR. SCI. (CAMB.), A.I.C.T.A. AND C. WHITEHEAD, B.SC. (HORT.), D.T.A. 92

NOTES ON CURRENT INVESTIGATIONS, RESEARCH, JANUARY TO MARCH, 1955 96

NOTES ON CURRENT INVESTIGATIONS, AGRONOMY, JANUARY TO MARCH, 1955 103

MECHANISATION. HALF-YEARLY REPORT, OCTOBER, 1954, TO MARCH, 1955 108

NOTES ON EXTENSION WORK, JANUARY TO MARCH, 1955 113

REVIEWS.

CACAO 120

A CRITICAL REVIEW OF THE WORLD LITERATURE ON THE LEPIDOPTEROUS STALK BORERS OF TROPICAL GRAMINACEOUS CROPS 123

GENERAL NOTES.

A VISIT TO MALAYA BY THE DEPUTY AGRICULTURAL ADVISER TO THE SECRETARY OF STATE FOR THE COLONIES 125

THE AGRICULTURAL TRAINING SCHOOL, PEKAN, PAHANG 126

DEPARTMENTAL.

DEPARTMENTAL NOTES 129

STATISTICAL.

MARKET PRICES, JANUARY TO MARCH, 1955 132

PRODUCTION OF PALM OIL AND KERNELS, FEDERATION OF MALAYA .. 134

MALAYAN AGRICULTURAL EXPORTS, OCTOBER TO DECEMBER, 1954 .. 134

RUBBER PRODUCTION, FEDERATION OF MALAYA 135

COPRA, COCONUT OIL AND COPRA CAKE PRODUCTION, FEDERATION OF MALAYA 136

METEOROLOGICAL SUMMARY, JANUARY, 1955 137

METEOROLOGICAL SUMMARY, FEBRUARY, 1955 138

THE MALAYAN AGRICULTURAL JOURNAL

The Journal is designed to present—as far as possible in non-technical terms—the results of the agricultural research, investigation and extension work in Malaya performed by the Department of Agriculture. Also, by means of selected articles, abstracts and reviews, this publication draws attention to the results of work of a similar nature in other countries, which have a bearing on agriculture in Malaya.

The Journal is published quarterly.

PRICE $2 PER COPY OR $8 PER ANNUM, POST FREE IN MALAYA; $8.50 OR £1 STERLING, POST FREE OUTSIDE MALAYA.

Publications may be obtained from the Department of Agriculture, Kuala Lumpur, Federation of Malaya, or from the Office of the Commissioner for Malaya in the United Kingdom, 57, Trafalgar Square, London, W.C.2.

A remittance to cover cost should accompany application for publications. Malayan currency $1 = 2s. 4d.

COMMITTEES OF THE DEPARTMENT

Standing Committee on Investigations.

The Deputy Director of Agriculture. (*Chairman*).
The Chief Research Officer.
The Chief Field Officer.
The Senior Agronomist.
The State Agricultural Officer, Selangor.
The Agronomist-in-Charge, Federal Experiment Station, Serdang.
The Publications Officer. (*Secretary*).

The Publications Committee.

The Director of Agriculture, Federation of Malaya. (*Chairman*).
The Deputy Director of Agriculture.
The Chief Field Officer.
The Chief Research Officer.
The Senior Agronomist.
The Publications Officer. (*Secretary*).

Examinations Board.

The Deputy Director of Agriculture. (*Chairman*).
The Chief Field Officer.
The Chief Research Officer.
The Senior Agronomist.
The Principal, College of Agriculture, Malaya.

The Advisory Council, College of Agriculture, Malaya.

The Director of Agriculture, Federation of Malaya. (*Chairman*).
The Director, Rubber Research Institute of Malaya, Kuala Lumpur.
The Principal, Sultan Idris Training College, Tanjong Malim.
The Principal, College of Agriculture, Malaya.
The Director, Veterinary Services, Federation of Malaya.
The President, United Planting Association of Malaya.
The President of the Malayan Estate Owners' Association.
The Hon'ble Che Hashim bin Awang, J.P., Tassek Glugor.
Dato Abdul Razak bin Dato Hussein, Kuala Lumpur.
Secretary of the Alumni Association, College of Agriculture, Malaya.
The Commissioner for Co-operative Development, Federation of Malaya.
The Registrar and Bursar. (*Secretary*).

THE

Malayan Agricultural Journal

Vol. 38, No. 2, 1955.

EDITORIAL.

Fodder Grasses in Malaya. Although the natural grasses and weeds of Malaya are sufficient to maintain the country's cattle population, their food contents and yields are such that cattle of low productivity result at the expense of land that could be growing crops.

The desirability of good fodder grasses for cattle in Malaya has for a long time been recognised by the Department of Agriculture, and comparative tests were made as long ago as the early 1920's. However, the first series of investigations proper was not started until 1932 and ended in 1938. Work was held up by the war, and experiments were not recommenced until 1947.

Mr. Henderson, who before going to Kelantan was Agronomist-in-charge, Federal Experiment Station, Serdang, has summarised the recent work on fodder grasses at that station in an article which will appear in the Journal in three parts, the first part appearing in this issue.

The Inheritance and Fragmentation of Malay Padi Lands. Another article in this issue of the Journal is the second of a series on padi land ownership in the Krian District of Perak by Mr. Wilson, the Agricultural Economist.

Mr. Wilson describes the process by which areas of land, originally issued in economic lots for padi cultivation, have become fragmented over the 50 years since the Krian Irrigation Scheme was first started. He shows that fragmentation occurs at a high rate where land is disposed of after the death of the owner but at a lower rate when an owner makes arrangements for donating his land before he dies. However, Mr. Wilson found, in addition, that padi land owners frequently apply practices which reduce the rate of fragmentation.

Cacao in the Nursery. The use of veneer tubes as an alternative to baskets for raising cacao seedlings in the nursery is described by two officers of the Agronomy Branch in a short article on later pages.

Veneer tubes were first used in Malaya by the Forest Department, and tests carried out by the Department of Agriculture at Serdang have shown that, although more care needs to be taken when handling them, they are cheaper than baskets and can be used more than once.

Rural Agricultural Training. In recent years the Department has laid emphasis on the training of farmers in growing better and more remunerative crops. Such activities take the forms of lectures and talks, agricultural newsletters, competitions, and courses at training centres situated in Agricultural Stations in many States.

A short note on the training school at Pekan, which was opened by H.H. the Sultan of Pahang in February, appears on page 126.

Just prior to going to press, we have learned with deep regret of the death of Sir Harold Tempany, C.M.G., C.B.E., D.Sc., F.R.I.C., who was Director of Agriculture, Straits Settlements, and Adviser on Agriculture, Malay States, from February, 1929, to July, 1936. After his retirement in 1936, Sir Harold was appointed Assistant Adviser on Agriculture to the Secretary of State for the Colonies, and, in 1940, Adviser on Agriculture. Sir Harold was 73.

THE CULTIVATION OF FODDER GRASSES IN MALAYA

PART I. Introduction.

BY

R. HENDERSON,

Acting State Agricultural Officer, Kelantan.

Grassland husbandry has developed into one of the most important elements of modern farming in many temperate climates. Similar advances, though on a more limited scale, are taking place in parts of the tropics. Malaya is not yet involved in this movement, however, and grass husbandry is virtually unknown in the country. The reasons for this are that the growth and productivity rates required of Malayan cattle are very small and natural grass and weed growth are sufficient to provide the maintenance and production requirements for these rates. It is worth emphasising that, while the condition of the cattle is good by tropical standards, there is no large surplus of natural feed which could be utilised for increase in the cattle population or intensification of cattle productivity. It follows from the foregoing remarks that grass husbandry will only develop as a result of demands for one or more of the following:- alternative utilisation of the land which now produces feed, increased cattle productivity rates, and increased cattle populations. The potentialities of these demands can best be assessed in the light of the main facts about the cattle industry in Malaya at the present time.

The total number of cattle (oxen and buffaloes) in the Federation of Malaya is about 450,000, of which about 42 per cent are kept in the States of Kelantan and Trengganu in the north-east of the peninsular. These numbers represent intensities of cattle population amounting to approximately one animal per 12 acres of all land devoted to agriculture over the Federation as a whole, and one animal per 2.6 acres of such land in the two States in the north-east. Little specific information is available about cattle growth-rates in Malaya, but it is fairly well established that they are, at most, as low as half those commonly experienced in Great Britain. By far the most important form of output required of cattle is work—beef and milk are produced on relatively very small scales—and some advantage is taken of the manurial value of cattle dung. The great bulk of the work done by cattle is in the cultivation of rice land. This lasts for only about two months of the year; it is preceded by a period of four or five months extensive and relatively abundant grazing over the fallow rice fields, and followed by a six or seven months lean period, when all vacant, waste and village grass lands are pressed into service for tethered grazing or for producing grass for cutting and carrying to the cattle. Although beef and fresh milk generally comprise very minor parts of the diets of Malayans, it is perhaps significant that the importance of beef increases considerably where it is locally produced, as in Kelantan, and is sold at roughly half the prices charged for imported frozen beef.

The outstanding features of the cattle industry emerge as its large scale, its low productivity, and its exclusive claims on about one-third of the rice producing land, in terms of acre-years. These features suggest that there is definite scope for intensification of cattle productivity and for intensification of rice production by release of rice land from its cattle feed producing function for off-season crops. There is thus a real potential demand for grass husbandry as an integral part of rice farming systems. Grass husbandry has only been considered in the light of its animal feed producing function in the foregoing paragraphs. It has a second, very important function in restoring soil fertility. This cannot be quite as directly related to existing farming systems in Malaya as can the former function, but it can be reasonably argued that it has very considerable potentialities as the basis of new, mixed farming systems on such presently abandoned lands as those comprising the undulating, lalang-covered areas which are so familiar to travellers along the North-South trunk road through Johore.

It has been with these broad considerations in mind that the Department of Agriculture in Malaya has carried out investigations of grass husbandry problems over the past 20 years. This work has taken place in two main periods, 1932 to 1938 and 1947 to the present day. It has embraced both fodder grasses for cutting and feeding and pasture grasses for grazing, but the main emphasis has been on the former, largely because yields of certain fodder grasses are commonly very high indeed in tropical countries, and because the problems involved are probably rather more simple than is the case with tropical pastures. The results of work on fodder grasses in the pre-war period have been reported in this Journal by Greenstreet and Greig (2), anonymous authors (1) and Simpson (5). Keeping (4) has reviewed certain results of work in the first three years of the post-war period. The present paper is the first of a short series intended to bring the account of work on fodder grass yields in that period up to date.

The most important conclusions from pre-war work were that normal yields of fodder grasses (mainly Guinea grass, *Panicum maximum*), grown on long cultivated, poor soils, were about 16 to 20 tons of fresh grass per acre per year, and that such yields could only be maintained beyond the first year of growth by annual applications of 10 to 15 tons of cattle manure per acre. These grass yields will support one to two Malayan cattle per acre, and the entire dung production of these animals is required to meet the cattle manure needs of the grass. The significance of the pre-war conclusions was thus that fodder grasses could not be used as the basis for development of mixed farming systems, involving arable phases which required substantial amounts of cattle manure.

This and the fact that yield levels of 16 to 20 tons per acre per year were far below those commonly attained in similar tropical countries led to the planning and execution of the post-war series of investigations. Work in other countries had shown that grass yields could be greatly increased by heavy application of artificial fertilisers. Hartley (3) reported in 1949 that trials on agricultural stations in Penang and Province Wellesley during

the early post-war period had given considerable promise that the more orthodox cattle manurial applications could be partially and possibly completely replaced by artificial fertilisers, with no accompanying falls in grass yields. The main emphasis in subsequent post-war experiments was therefore placed on the use of artificial fertilisers. Other subjects were included, e.g. irrigation, variety, and cutting intervals, but they were subordinate to the use of fertilisers.

All the experiments described in the present series of articles were carried out at the Federal Experiment Station, Serdang. They were sited on an area of fairly uniform soil type, which is flat, low-lying, long cultivated and well drained. The soil is a leached phase of a Serdang sandy loam. It is easy to work and is inherently of poor fertility. Chemical analyses of soil samples from a part of the area showed that organic matter and available potash contents were low and the pH was in the range 4.3 to 5.4. Results of mechanical analyses were as follows (figures are percentages):—

Clay	Silt	Fine Sand	Coarse Sand	Gravel.
22 to 25	24 to 27	30 to 34	18 to 21	Traces.

Considerable restraint marked the initial post-war approach to the use of fertilisers on fodder grasses. There was the feeling that not much more could be expected of them than maintenance of "normal" yield levels by replacement of the cattle manure applications. The design and treatments of one of the early trials, which is described in the following paragraphs, well illustrates this cautious approach. The trial is of very considerable importance, however, since it is the only one of the series in which both cattle manure and fertilisers were tested.

EXPERIMENT NO. F.E.S.S. 68.

The objects of the investigation were:—

(a) to discover if partial or complete substitution of 10 tons cattle manure per acre per year by an artificial fertiliser mixture resulted in any reduction in yields of three fodder grass species, during a four year period;

(b) to explore the effects on yields of three fodder grasses of a very much greater annual application of fertilisers than had previously been considered "economic"; and

(c) to compare the effects on yields of fodder grasses of 5 tons cattle manure when applied in addition to a similar basal dressing, and to a basal dressing of 3 cwt. fertilisers per acre per year.

The design of the experiment comprised split plots in six randomised blocks. The treatments were as follows:—

Main Treatments.

A. Napier grass (*Pennisetum purpureum*)
B. Guatemala grass (*Tripsacum laxum*)
C. Guinea grass (*Panicum maximum*)

Sub-Treatments.

(i) 5 tons cattle manure per acre per year.
(ii) 10 tons cattle manure per acre per year.
(iii) 3 cwt. artificial fertiliser mixture per acre per year.
(iv) 6 cwt. artificial fertiliser mixture per acre per year.
(v) 12 cwt. artificial fertiliser mixture per acre per year.
(vi) 5 tons cattle manure plus 3 cwt. artificial fertiliser mixture per acre per year.

The dimensions of the experiment were 156 x 86 ft. per block, 156 x 28 ft. per plot for Guinea and Napier grasses, 156 x 30 ft. per plot for Guatemala grass and 26 x 28 ft. or 26 x 30 ft. per sub-plot. The area harvested for recording purposes was 22 x 24 ft. for all sub-plots. The different planting distances of Napier and Guinea grasses on the one hand, and Guatemala on the other, are the reasons for the variations in plot and sub-plot sizes.

The site of the experiment has been described earlier in this paper. The area was under a poor stand of old tea, interspersed with a few shade trees (*Albizzia* spp:), until shortly before the beginning of the experiment. The tea and shade trees were cleared and the site cultivated in August and September, 1949. Napier and Guinea grasses were planted at 2 x 2 ft., and Guatemala at 3 x 2 ft. spacings towards the end of September, 1949. They established reasonably well but some supplying was necessary in October of the same year. Hand weeding and inter-row cultivation were carried out when considered necessary.

The manuring, cutting and recording programmes are described below. Cattle manure was applied, in January of each year, in shallow, hand-hoed furrows between the grass rows and was lightly covered with soil. Annual artificial fertiliser dressings were divided into four equal parts, one of which was applied in each of the months January, April, July and October. They were hand-broadcast on the soil surface, between the rows of grass. Compositions of the dressings are given in Table I; the change shown in the Table was made on evidence from an adjoining trial.

Table I.

Experiment No. F.E.S.S. 68.

Composition of Artificial Fertiliser Dressings.

(parts by weight)

Period.	Sulphate of Ammonia.	Superphosphate.	Muriate of Potash.
Up to and including the 2nd application on 30th April, 1950.	3	2	1
All subsequent applications.	3	None	3

Guatemala grass was cut at about two monthly intervals, and Napier grass at about 1½ monthly intervals throughout the trial. Guinea grass was

cut at monthly intervals over the period of the first 11 harvests; thereafter it was cut at 1½ monthly intervals. Harvesting was by hand sickle. Areas from which yields were recorded were cut on the day following the harvesting of discard strips. A pre-treatment cut of all grasses was taken at the end of January, 1950, and the first application of the sub-treatments took place soon afterwards. The first experimental harvests were taken in February and March, 1950.

In the later years of the trial, growth was generally healthier and more vigorous in those plots which received cattle manure than in those which did not.

Annual yields have been statistically analysed, "years" being regarded as a further subdivision of treatments in the analysis of variance. Yield data are given in Tables II and III.

Table II.
Experiment F.E.S.S. 68.
Mean Annual Treatment Yields.
(tons cut grass per acre)

Variety	Treatments						Mean
	10 tons C.M.* (ii)	6 cwt. A† (iv)	5 tons C.M. + 3 cwt. A. (vi)	3 cwt. A. (iii)	5 tons C.M. (i)	12 cwt. A. (v)	
Napier	15.93	15.31	18.29	12.68	12.55	20.72	15.91
Guatemala	12.48	17.88	19.30	14.64	12.06	23.14	16.58
Guinea	13.33	14.33	16.15	12.55	10.28	20.07	14.45
Mean	13.91	15.84	17.91	13.29	11.63	21.31	15.65

* C.M. = Cattle manure.
† A. = Artificial fertiliser mixture.
Standard error of sub-treatment means = ±0.4106 tons per acre.

Table III.
Mean Yields Per Sub-Treatment Per Year.
(tons cut grass per acre)

Year	10 tons C.M. (ii)	6 cwt. A. (iv)	5 tons C.M. + 3 cwt. A. (iv)	3 cwt. A. (iii)	5 tons C.M. (i)	12 cwt. A. (v)	Mean
1st	14.35	16.61	17.27	14.80	12.25	23.00	16.38
2nd	11.87	17.52	16.89	13.69	10.09	25.62	15.95
3rd	14.40	14.33	19.20	11.99	11.82	18.31	15.01
4th	15.04	14.89	18.28	12.68	12.35	18.31	15.26
Mean	13.91	15.84	17.91	13.29	11.63	21.31	15.65

Standard error for testing manures x years interactions ±0.3310 tons per acre.

Standard error manurial mean yields per year ±0.4953 tons per acre.

The conclusions which are drawn from these results are as follows. No reductions in yields of fresh grass resulted from either partial or complete replacement of 10 tons of cattle manure per acre per year by artificial fertilisers at the rate of 3 cwt. per 5 tons of cattle manure over the four years of the trial. Very substantial additions in yield were obtained by increasing the fertiliser application from 3 to 12 cwt. per acre per year ($P = 0.001$); these additions were obtained for all the species tested and in all years of the trial. No reduction in the rate of response to fertiliser took place over the range of application 3 to 12 cwt. per acre per year ($P = 0.05$; tested by comparison of differences between yields from Sub-treatments (iv) and (v) and double the differences between yields from Sub-treatments (iii) and (iv)).

Conclusions in regard to the third object of the experiment were drawn by comparing the yield increments obtained when 5 tons of cattle manure was added to 3 cwt. of fertiliser, with those obtained when 5 tons of cattle manure was added to a basal dressing of the same amount of cattle manure. It will be appreciated that such increments can be calculated by subtracting the yields of Sub-treatment (iii) from those of Sub-treatment (vi), and those of Sub-treatment (i) from those of Sub-treatment (ii). The various increments and their comparisons are shown in Table IV.

Table IV.

Experiment F.E.S.S. 68.

Comparison of Effects of 5 Tons Cattle Manure when Applied in Addition to 3 Cwt. Fertilisers and to 5 Tons Cattle Manure.

(tons cut grass per acre per year)

Variety and Year	Yield Increments from Application of 5 tons Cattle Manure in addition to:-		S. E. Increments	Differences Between Increments	S. E. Differences
	3 cwt Fertiliser	5 tons Cattle Manure			
Napier	5.61	3.38	±1.0058	2.23	±1.4224
Guatemala	4.66	0.42		4.24	
Guinea	3.60	3.05		0.55	
1st year	2.47	2.10	±0.7004	0.37	±0.9906
2nd year	3.20	1.78		1.42	
3rd year	7.21	2.58		4.63	
4th year	5.60	2.69		2.91	
Mean	4.62	2.28	±0.5807	2.34	±0.8212

It is concluded from these comparisons that an additional 5 tons of cattle manure was effective in increasing yields both when applied with 3 cwt. fertilisers and when applied with an equal basal dressing of cattle manure. It is further concluded that this effectiveness was generally greater in the case of addition to fertilisers than in the case of addition to basal

cattle manure, and finally that this superiority was enhanced from the second to the third year of the experiment.

Although this experiment is open to criticism on several counts, its results are important in two fundamental respects. They clearly indicate, in the first place, that artificial fertiliser can efficiently replace a part of the orthodox cattle manure applications. In the second place, they suggest that the ideal manurial programme should probably include both artificials and cattle manure, and that a special value of the latter may well lie in its ability to maintain yields of fresh grass in the later years of growth.

Succeeding articles will deal with trials which investigate the potentialities of fertilisers in more detail, and will show that very much higher yields than those obtained in F.E.S.S. No. 68 are possible, but they will also demonstrate that artificial fertilisers alone are not satisfactory for the production and maintenance of high grass yields over a period of years.

References.

1 Anonymous authors (1938): "Experiments with Guinea Grass at the Central Experiment Station, Serdang"—*Malay. agric. J.*, **26**, 224.

2. Greenstreet, V.R. and Greig, J.L. (1933): "Manurial Experiments with Guinea Grass at Serdang"—*Malay. agric. J.*, **21**, 543.

3. Hartley, C.W.S. (1949): Unpublished Report.

4. Keeping, G.S. (1951): "A Review of Fodder Grass Investigations, 1947 to 1950"—*Malay. agric. J.*, **34**, 65.

5. Simpson, H.J. (1940): "Manurial Experiments with Guinea Grass at the Central Experiment Station, Serdang"—*Malay. agric. J.*, **28**, 171.

THE INHERITANCE AND FRAGMENTATION OF MALAY PADI LANDS IN KRIAN, PERAK.

BY

T. B. WILSON,

Agricultural Economist.

Introduction.

The most economic size or sizes of padi holdings in Malaya have not yet been scientifically determined. The important Government schemes for the expansion of padi lands in the last 20 years have decided the size of holdings, initially at least, by the issue of surveyed lots with registered titles. But these holdings have not remained static in size, and this article describes the direction and strength of the main factors which have affected the area of padi lots registered in Krian.

The area of a peasant's padi lot is reduced more usually by sharing and increasing the number of owners than by voluntary sub-division and re-survey, this being more expensive[1]. Theoretically, the buyer or inheritor of a one-sixth "share" of a lot is entitled to that fraction of the total production from that lot; but in practice for annual crops he individually cultivates one-sixth in area—an actual piece of land, partitioned off with a bund of earth and off-season weedgrowth. The word "fragment" is less misleading than "share", which is more usual in Malaya but suggests co-operative division of labour and produce. However, where the owners undertake no cultivation, e.g. on land planted with a permanent crop such as coconut or on land rented out to tenant padi farmers, the co-owners frequently divide the net income or the rent from the whole lot according to their respective shares.

Fragmentation in Malay padi lands may be described as the process by which the lot is subject to partition into discrete parcels and from which the padi farm evolves as a group of such parcels often scattered from each other and from the house site. It is closely associated with the existence of other forms of tenure besides ownership.

Change of Ownership.

All land transactions are registered in Malaya either for each title or for each lot (the latter being equivalent to the Torrens System which allows quick recording and ready inspection of the facts of ownership for large numbers of peasant owners). Most transactions involve a change of ownership on the whole lot or a share of a lot. The effect may be different on the share from that on the whole lot, for the transfer of a half share by two co-owners to one buyer appears consolidatory, but will not be so should the two retain their remaining half share, the lot now having three instead of two co-owners. Alternatively a man may sell a quarter share to three other people,

[1] Lots may be subdivided involuntarily for social purposes by the construction of roads and canals.

apparently a fragmentary sale, but in fact consolidatory if these buyers already own other shares in the same lot. A transaction can be regarded as fragmentary only if it increases, and consolidatory only if it decreases, the total number of co-owners on the whole lot.

Change of land ownership occurs either in the form of voluntary transfer by a living person as a sale or a gift ("a transfer for love and affection" or a "deed of trust") or in the form of a transmission after his death upon the distribution of his estate.

Donation Before Death.

Transfers "for Love and Affection".

The land donated before death amounts to one third of that transmitted by distribution afterwards. The gifts mainly take the form of transfers "for love and affection" (90 per cent in contrast to 10 per cent as "deeds of trust"), and the intentions of the donors are to some extent discoverable by analysing the relationship between the transferor and the transferee, and the type of gift made[1]. The same dues are payable as on land transmitted after death, so the object is not to evade taxation.

Almost all of the transferors were Malays, mostly male (Table I), and most of the transferees were female. More daughters than sons received gifts of land from either sex of their parents (Table II).

Table I.

Distribution of Transfers "for Love and Affection" by Sex and Race of Transferor

Sex	Malay	Chinese	Indian	Total
Male	107	7	4	118
Female	59	—	—	59
All	166	7	4	177

Although the ownership of land in Krian is divided nearly equally between the sexes, only one husband received land from his wife, but 19 gave to their wives, 13 of whom were the only beneficiaries, and six of whom shared

[1] All transfers "for love and affection" registered between 1951 and June, 1954, were examined; they numbered 177, exactly 10 per cent of all recorded transfers of land.

Table II.

Relationship between the Transferor "for Love and Affection" and the Transferee.

Sex of Transferors	Male Transferees							
	Son	Grand son	Nephew	Brother	Cousin	Father	Husband	All
Male	33	8	2	8	–	–	–	51
Female	25	4	3	2	1	2	1	38
Total	58	12	5	10	1	2	1	89

Sex of Transferors	Female Transferees									
	Daughter	Adopted Daughter	Grand Daughter	Niece	Sister	Cousin	Mother	Wife	Aunt	All
Male	77	1	7	2	7	1	1	19	1	116
Female	33	–	3	–	3	7	2	–	–	48
Total	110	1	10	2	10	8	3	19	1	164

equally with other relatives[1]. These transactions show less affinity to the patriarchal Muslim law than to the matriarchal features of Malay customary law, which is still influential in fundamental matters of peasant life such as land ownership (Table III). A Malay landowner may freely dispose of his property during his lifetime, but upon his death it must be distributed according to the unanimous wishes of the co-heirs after his decease or to the Muslim laws of succession. In certain circumstances the extent of a Muslim will is limited to one third of the estate, and in fact Malay wills are rarely made. The transfer "for love and affection" enables the landowner to choose between the Muslim and the Malay customary methods of distribution of his property.

[1] Under Muslim law, male claimants are entitled to double the share of female claimants of the same relationship, whilst under Malay custom they share equally.

Table III.

Distribution of Transfers "for Love and Affection" according to Sex Equality of Share where there are Transferees of Each Sex of Equal Status*

	Equal Shares	Unequal Shares		Total
		Pro-male	Pro-female	
Male Transferor	16	3	1	20
Female Transferor	7	–	1	8
Total	23	3	2	28

* for example, brother and sister.

TRUST DEEDS.

Trust deeds are numerically less important in Krian, only 81 were registered between 1947 and 1954. Few deeds were registered immediately before or after the war (an average of five from 1937 to 1940, and six from 1947 to 1949 inclusive) but recently they have become more popular, approximately 15 being registered every year from 1949 to 1954. Trust deeds may fulfil the normal administrative function of protecting the legal minor, but they also offer the same freedom of action to property-owners as the transfer "for love and affection", permitting similar control over the succession to their property after death and in addition some continued control over the use before death.

In an analysis of all the trust deeds registered since the war, men and women owners tended equally to use this instrument but for different purposes. More males benefitted from male than from female benefactors, and contrariwise. But more females benefitted from female benefactors than males from male benefactors, for one quarter of these latter donated to schools, mosques or burial grounds. Altogether the male beneficiaries out-numbered the female. In one deed the sole female recipient was an adopted daughter, and another deed excluded the husband although he was then alive. In more than half the deeds all the beneficiaries were female to the exclusion of male beneficiaries, and of the *Bait-ul-mal* (Muslim Treasury) which would otherwise benefit[1]. Female beneficiaries received equal shares with males in most of the instances where there were beneficiaries of each sex. The beneficiaries were mainly minors and would receive the land on attaining

[1] Under a Muslim law recently introduced into Perak, where all the heirs are female the residue of the property for distribution goes into the Muslim Treasury, e.g. Krian Distribution Suit 33 of 1952, the wife received one-quarter her share as a widow without children and the Bait-ul-mal three-quarters.

their majority, though one in ten would have to wait until after the death of the trustee. In most trust deeds there are complementary and sometimes contradictory wishes expressed: (i) that the recipients obtained ownership of the land upon their majority (84 per cent of all deeds), and (ii) that the present owner or trustee should enjoy the profits during his lifetime (58 per cent of all deeds). Evidently the trust deed imperfectly fulfils the intentions of some owners to give away land in a particular manner at death and until then to control it themselves.

Inheritance on Death.

Distribution Suits.

After death, choice lies with the valid claimants as to the method of distributing the estate. They may reach a private family *pakat* (agreement) possibly based on the *umanat si-mati* (deceased's wishes) or traditional Malay customs. The Malay customs range from those which have the force of law, e.g. *harta sa-pencharian* (jointly earned property)[1], to those which are merely frequent local practices, e.g. equal shares to sons and daughters in Perak. They may alternatively choose the *praidz* (the shares specified by Muslim law as appropriate to their relationship to the deceased, e.g. one-eighth to the widow with children, one-quarter to the widow without children: males receiving twice the share of females of the same degree of relationship, e.g. brother and sister). Where they cannot reach a unanimous agreement in this manner, the Collector of Land Revenue is empowered to distribute according to Muslim law.

More than half (53 per cent) of the distribution cases for Malay property in Krian[2] were decided according to Muslim law, and a greater proportion among the Banjarese and Other Malaysians who comprise 42 per cent of the total Malaysian population (proportion at the time of the 1947 census). It is not possible now to distinguish those cases where Muslim law was chosen from those cases where it was applied by the Collector because of disagreement among the relatives.

Not all distributions of estates are reported to the Land Office for official registration. This is often regarded as unnecessary when the beneficiaries are closely related and have reached a satisfactory agreement among themselves. When, later, sometimes after 25 years, one beneficiary dies or wishes to transfer the property, the distribution is more likely to follow Muslim law, owing to the natural increase in the number of claimants and in the possibility of dispute.

There was less registration than usual during the war years, and in one-third of the cases the lapse between death and the petition for distribution exceeded 10 years, whilst in 12 per cent of cases the delay amounted

[1] State of Perak Enactment No.6 of 1951, *Majlis Ugama Islam dan Adat Melayu.* Example: Krian Distribution Suit No. 238 of 1949, where the widow claimed that, although the whole padi land lot of 4¾ acres was registered in her deceased husband's name, in fact one half was hers because they had together developed it from the jungle forty years previously.

[2] Result of an analysis of a 1 in 5 sample of 820 Distribution Suits registered in Krian from 1949 to 1952.

to over 20 years (Table IV). The process of fragmentation on some lots is therefore more advanced than might appear from the Land Office Registers, and in sample surveys based on these records considerable trouble is sometimes experienced in identifying and locating peasants for interview[1].

Table IV.

Number of Years Delay between Dates of Death and of Distribution Suit.

No. of Years	Percentage of Distribution Suits of Each Race				
	Malay	Other Malaysian	Chinese	Indian	Percentage of all Suits
Less than 2	23	45	50	50	23
2 and below 5	16	33	50	33	18
5 „ „ 10	39	11	—	17	28
10 „ „ 15	13	7	—	—	13
15 „ „ 20	2	—	—	—	6
20 and over	7	4	—	—	12
	100	100	100	100	100

Average delay between death and petition = 8 years 3 months.

It is the experience of many Land Officers that the cases of delayed distribution are most difficult to settle. In Krian, the cases in which Muslim law was applied showed an average delay of 10 years six months, against five years seven months for the rest, and they also showed a larger number of beneficiaries to the estate, a smaller proportion of whom renounced their shares (9 per cent against 27 per cent of the rest). Although Muslim law is applied in one half of the Krian Distribution Suits, the proportion is appreciably less where the application is not delayed (39 per cent of cases with less than 5 years delay but 71 per cent of cases where the delay exceeds 15 years).

Renunciation.

Shares may frequently be renounced by a beneficiary in favour of all the remainder or of specified individuals, even where Muslim law may have

[1] This delay should be distinguished from the administrative delay between the date of presentation of the petition in the Land Office and of its final settlement.

been chosen or applied. This results in shares different from those under Muslim law and a lower rate of fragmentation, e.g. Mukim Tanjong Piandang, E.M.R. 1579, Lot 1453:—

Claimants	Relationship to Deceased	Shares under Muslim Law	Renunciation in favour of:-	Actual Shares Resulting
(a) Haji Ismail	Widower	10/40	—	10/40
(b) Che bt. Ismail	Daughter	3/40	—	15/40
(c) Kabsah bt. Ismail	„	3/40	—	15/40
(d) Yahya b. Ismail	Son	6/40	b + c equally	—
(e) Sabrin b. Ismail	„	6/40	b	—
(f) Sabran b. Ismail	„	6/40	c	—
(g) Abdul Rahman b. Ismail	„	6/40	b + c equally	—

At least one beneficiary renounced his (her) share in 24 per cent of all cases distributed according to Muslim law in which there were two or more co-heirs to the estate. A recent trend in the opposite direction towards increased fragmentation occurs in those cases where there are only female beneficiaries, for the residue of this property goes to the Muslim Treasury. This residue may be bought back by these females (in which it acts only as specifically female tax) but it may be bought by any other, so increasing the number of owners on the lot.

Surrender of proprietary rights is also made by persons allocated land by Malay custom and to a relatively greater extent, even though in the first instance the participants in an estate distributed by custom or agreement are usually fewer than the number who could rank as heirs under a distribution according to Muslim law. Table V shows the comparative frequency of this practice among the cases where Muslim law is chosen or applied and among the cases where the relatives have reached a private agreement.

Table V.

Percentage Distribution of Suits following (a) Muslim Law and (b) Malay Custom according to Number of Beneficiaries Renouncing their Shares.

No. of Beneficiaries Renouncing	(a) Muslim Law	(b) Malay Custom	All Suits
None	per cent 76	per cent 42	per cent 61
1	14	28	21
2	4	13	7
3	1	4	2
4	2	7	5
5	2	6	3
6 and over	1	—	1
	100	100	100

Rights in the estate are renounced for many reasons, occasionally in return for some consideration: for example, a daughter may have received land before her father's death which she considers her share; a son may previously have sold his expected share to a co-heir; land may be renounced in favour of the person who bore the expenses at the funeral. Often the children wish to ensure that the widow is adequately provided for, and consequently the distribution of property by mutual consent according to Muslim law may approximate very nearly after renunciation to a distribution under Malay custom. In all instances the effect is the same—to retard the process of fragmentation. Over all Distribution Suits, the practice of renunciation reduces the resulting number of owners by 11 per cent.

Land values are relatively high in Krian where in some coastal areas the padi yields and rural population density are double the averages in the other main padi growing areas of Malaya. Land ownership assumes an importance exaggerated on purely commercial grounds and no rights are renounced in 66 per cent of all suits, often without consideration of the actual value of the estate[1].

Transfer of Ownership by Sale.

Sales are the most numerous type of documents registered, and for every eight presentations of donation or inheritance there are fifteen documents of sale, which are the most important deeds involving change of ownership of land. But they have the least fragmentary effect, for sales usually take place between two individuals only and so involve little change in the total number of owners of the lot. Over all, in fact, sales reduce the number of owners on those lots (6.7 per cent in a sample of 500 sales), whilst all other changes of ownership generally increase the number of owners.

Table VI.

Distribution of Transfers "for Love and Affection" (T.L.A.) by Co-ownership on the Lot Before and After the Transfer.

No. of Co-owners	BEFORE		AFTER	
	Number of T.L.A.	Per cent	Number of T.L.A.	Per cent
1	172	97	95	54
2	4	2	62	35
3	1	1	8	4
4	–	–	6	3
5	–	–	3	2
6 and over	–	–	3	2
Total	177	100	177	100

[1] E.g. Krian Distribution Suit 146/1949, the estate consisted of 3¾ acres and, 21 years after the man's death, there were 25 valid claimants none of whom renounced his share, although the share of the least was 7/1440. The estate was was auctioned by the Collector to the highest bidder among the claimants.

Fragmentation.

Almost all of the transfers "for love and affection" involved single-owners' lots before the transfer but a half had co-owned lots afterwards (Table VI). One transfer was consolidatory, i.e. reduced the number of owners, but slightly less than half of the rest were fragmentary (Table VII). The net effect of the two opposing processes is shown to be fragmentary in Table VIII.

Table VII.

Distribution of Transfers "for Love and Affection" (T.L.A.) by the Effect on Ownership and by Race.

Effect of Transfer	Malay	Chinese	Indian	All T.L.A.	Per cent
Fragmentary	79	1	–	80	45
Consolidatory	1	–	–	1	1
Nil	86	6	4	96	54
All	166	7	4	177	100

Table VIII.

Distribution of Malay Transfers "for Love and Affection" (T.L.A.) by Rate of Fragmentation or Consolidation.

Percentage Rate of Fragmentation	Fragmentary T.L.A.		Consolidatory T.L.A.	
	No.	Per cent	No.	Per cent
Below 100	1	1	1	100
100 - 199	59	74	–	–
200 - 299	8	10	–	–
300 - 399	6	8	–	–
400 - 499	3	4	–	–
500 + over	2	3	–	–
All	79	100	1	100

The process of fragmentation may be retarded by this type of transfer where the transferor owns several lots and has several beneficiaries. In 34 such cases, 28 of the transferors made separate transfer documents for each lot giving them often one to each beneficiary. As a result, a smaller number of lots transferred became fragmented and at a lower rate. The rates of fragmentation of the individual lots and of the whole estate are compared in Table IX.

Table IX.

Comparison of Rates of Fragmentation of Individual Lots and the Whole Estates in 28 Multiple-Lot Estates

Percentage Rate of Fragmentation	Individual Lots		The Whole Estates	
	Lots	Per cent	Estates	Per cent
Below 100	Nil	–	1	3
100 - 199	25	37	7	25
200 - 299	5	7	8	29
300 - 399	2	3	2	7
400 - 499	2	3	3	11
500 + over	Nil	–	2	7
Total Fragmentary	34	50	23	82
Nil Effect	34	50	5	18
Consolidatory	Nil	–	Nil	–
All	68	100	28	100

In Distribution Suits, similarly, where the estate of the deceased consists of several lots or shares of lots, the beneficiaries have the opportunity to divide the estate by lots into the appropriate fractions. This opportunity is taken on only one out of the three occasions presented and much more frequently when the beneficiaries distribute by consent than where they follow Muslim law. Numerous and remotely related beneficiaries tend to be more conscious of the real or supposed differences in value of the different lots of land; and difficulty of compromise in distribution leads to greater difficulty of cultivation in the resulting fragments of each lot.

The Rate of Fragmentation.

The process of fragmentation of padi lands in Krian has been measured for all the main types of transactions involving change of ownership, and for each transaction a rate of fragmentation or consolidation has been calculated, i.e. the percentage increase or decrease in the number of owners on the lot as a result of the transaction.

Fragmentation of land occurs in two out of every three Distribution Suits at a high rate (one in three has a Rate of Fragmentation over 200 per cent), but in only one out of every two transfers "for Love and Affection", where the rate is lower (only 1 in 10 has a Rate over 200 per cent). The process is least in the sales of land, of which only 19 per cent are fragmentary, at a low rate. (Table X).

The process of consolidation is negligible, except in the sales of land which also contain the greatest proportion of transactions involving no

Table X.

Percentage Distribution of Main Types of Changes of Ownership by Rate of Fragmentation.

Percentage Rate of Fragmentation	Transfers for Love and Affection	Distribution Suits	Sales
Below 100	–	15	7
100 – 199	34	21	10
200 – 299	5	11	2
300 – 399	3	9	–
400 – 499	2	3	–
500 + over	1	9	–
Total fragmentary	45	68	19
Nil effect	54	25	61
Consolidatory	1	7	20
All	100	100	100

change in the number of owners. The same table shows that among the affectionate transfers of land by the owner before death there results a greater proportion (54 per cent) of cases where there is no effect on the number of owners than where the relatives at his death distribute the property (25 per cent).

The average rate of fragmentation was calculated for all the types of transaction sampled. Distribution Suits after death are responsible for fragmentation at an average rate of 85 per cent per transaction (100 per cent would indicate that the owners had doubled), whilst the average rate is somewhat lower for those owners who donate their property before death or whose heirs divide the property by consent. The average sale shows a slight tendency to reduce the number of owners on the lot (Table XI).

All types of transaction are not equally numerous and it is necessary to weight the average rate for each type by its relative importance, judged by the number of such documents annually presented for registration at the Parit Buntar Land Office (based on an average of six years from 1948 to 1954) and by the number of lots or shares of lots involved in each transaction (lots or shares are usually sold singly, but 40 per cent of the Distribution Suits refer to two or more). The Distribution Suit is found to be the most important cause of fragmentation, whilst the overall rate of fragmentation of padi land is reduced appreciably by donations before death and very considerably by sales (Table XI). Consequently, lots affected by registered transactions involving a change of ownership are subject to an overall average rate of fragmentation of 30 per cent per transaction (Table XI).

Summary.

The article describes the process by which padi lands in Krian have become fragmented and measures the rate of this process annually. The

Table XI.

Weighted Average Rates of Fragmentation for Each Type of Transaction.

Type	(i) Av. Rate of Fragmentation per Transaction	(ii) Av. No. of Transactions per Year	(iii) Av. No. of Lots per Transaction	(iv) Av. No. of Lots Involved per Year	(v) (i) x (iv)
	Per cent				
Affectionate Transfer	65	68	1.19	81	5,265
Trust Deed	66	15	1.10	16	1,089
Distribution Suit					
a) Muslim Law	107	103	1.65	170	18,190
b) Malay Custom	56	92		152	8,512
Sale	– 6.7	522	1.09	568	– 3,805
All		800		987	29,251

Overall average rate of fragmentation = (v) ÷ (iv) = 30 per cent per transaction.

analysis is based on sampled documents of each main type of transaction affecting ownership. The documents often registered changes which have occurred sometime earlier: the bias caused is not measurable but probably understates the rate of fragmentation rather than distorts the process. The padi land owners themselves frequently employ practices which considerably reduce the rate of fragmentation. These practices, well founded in Muslim principles or Malay customs, result in higher land values, and allow cultivation of land in more manageable units. In contrast, complete fragmentation may result from the difficulty of reconciling the differential values of individual lots and from the psychological incentive to the retention of property, however insignificant, where its possession is written in a permanent documentary register of the Torrens type. The very civilising Muslim law exercised its humanising influence on the Middle East countries based upon the social institution of patriarchy, polygamy and slavery, with property mainly movable and divisible consisting of camels, goats and jewels. Where this law has been arbitrarily applied to other Middle East societies based on property mainly in the forms of immovable land, partition has often brought serious impoverishment to the peasant. The Malay peasant, though largely illiterate, has drawn considerably upon his traditional pre-Muslim *adat Melayu* (Malay customs) to retard the registered process of fragmentation. In practice, after registration further consolidation often occurs when peasants renounce or exchange their shares, or increase the size of their farms by renting the land of non-cultivating owners for cash or for padi, usually on a yearly basis.

Conclusion.

The experience of fifty years of peasant land-owning in Krian provides an indication of the trends in the newly developed padi areas of Malaya, where land has been issued in lots equal in theory to the most economic units for padi cultivation. In less than two generations, a considerable number of the lots issued will bear little relation to the areas owned.

Fragmentation arises in certain basic conditions of increasing population density, high land values, lack of alternative local employment for and immobility of labour and capital, so that land is virtually the sole income yielding investment. In this environment, fragmentation is due to laws of succession which authorise or compel division among the co-heirs, who are able to register their proprietary rights. Land subdivision is aggravated when beneficiaries attempt to share equally the various lots, varying in soil, in nearness to water canals for drainage and irrigation, in distance to the road for domestic access and padi transport and in value of secondary income from coconuts and fishponds. A dependence predominantly on padi land as a means of life enhances the importance of the physical possession of land. Normal human feelings, exaggerated by the moral pressure of inlaws and distantly-related claimants in cases of long delay, may render the physical partition of the land the only acceptable method of dividing an estate; the lack of facilities for borrowing money on reasonable terms may make it the only possible method. In a situation where many people firmly retain the

ownership of limited areas of land, the process of fragmentation once initiated accelerates with each successive generation.

This experience suggests the need for critical enquiry into the policy of land alienation, the registration of property rights to land, the taxation of peasants through land transactions, the costs of land survey and the inheritance of padi land to ascertain whether sufficient incentives exist to ensure that the registration of land is a reasonably accurate statement of the actual claims and areas and to remove those administrative obstacles which prevent the adoption of better systems. The basic principle is that the pattern of ownership does not prejudice the stable cultivation of this land in economic farm units and farm sizes.

Acknowledgements.

The writer is indebted to Dato Shabandar Ibrahim bin Abdul Karim, District Officer, Krian, for guidance on Malay subjects and to Mr. V. C. W. Kenyon, formerly Land Commissioner, Abyan, Western Aden Protectorate, for advice and information particularly on Muslim law.

THE USE OF VENEER TUBES FOR RAISING CACAO SEEDLINGS

BY

E. F. ALLEN,

Senior Agronomist,

AND

C. WHITEHEAD,

Agronomist,

Introduction.

The efficiency of all agricultural operations is judged by costs, and it is particularly essential, when dealing with a new crop, to submit each operation associated with that crop to the discipline of careful costing.

A conservative estimate of the cost in Malaya of bringing cacao into bearing at four years' old gives an approximate figure of $900 per acre (£105) when the shade used is thinned jungle. Of this sum, nursery work accounts for $272 in the first year with $30 for later supplying. This is made up from the cost of purchasing or making plant baskets, treating these where necessary with a suitable preservative, filling with a suitable potting compost, sowing seed and tending the young seedlings in shaded nurseries. Where the planting distance adopted is 8 x 8 ft., 680 seedlings are required per acre with an additional 10 per cent for supplying. This works out at approximately 40 cents per basket seedling of which 12 to 20 cents represents the cost of the untreated basket, the price varying with locality.

This cost of baskets represents an average expenditure of $120 per acre, or 13.3 per cent of the total cost of bringing the crop into production. It can be eliminated or reduced by one of the following measures:-

(i) sowing seed at stake,

(ii) lifting seedlings carefully in the nursery and planting with bare roots or with some soil adhering, or

(iii) by using cheaper containers, or containers which can be used more than once.

Trials to-date have indicated that seed-at-stake sowing of cacao in Malaya gives poor results and the method cannot yet be recommended.

Experiments with the transplanting of bare-root seedlings are in progress but the method must still be considered experimental. Even if moderately successful, it would be more suitable for use by smallholders than by estates because of seedling deterioration when transported any great distance.

This short paper describes the use of wood veneers as alternatives to plant baskets. They are cheaper and can be used several times.

PLATE I.

Dipped veneers stacked for draining and drying.

PLATE II.

Coconut husks being placed in the bottom of a tube prior to filling with potting compost.

PLATE III.

Cacao seedlings in veneer tubes at different stages of development. The largest are ready for planting in the field.

PLATE IV.

Planting hole dug, with veneer tube in position. The lower wire ring has been removed.

PLATE V.

The planting hole has been filled firmly with topsoil, and the operator is now gripping the top of the tube.

PLATE VI.

The operator has pulled the tube up with a sharp jerk and the seedling remains in the soil.

PLATE VII.

The tube is now lifted carefully to avoid damaging the leaves.

PLATE VIII.

Planting completed with the minimum of soil disturbance. The veneer tube can now be used again.

Nursery Practice.

Veneer tubes were first used in Malaya by the Forest Department and the technique of their construction and use was worked out by Mr. R. C. Barnard, Silviculturist at the Forest Research Institute, Kepong. This has been described elsewhere (1) but is repeated here for convenience.

Single-ply veneers of mixed species can be obtained from local plywood factories at $5 per 100 for the 15 x 9 in. size. When ordering these it is important to specify that the grain should be parallel with the 9 in. edge.

The veneers are treated before use with a copper naphthenate-kerosene mixture such as is used for treating seed boxes and planting baskets. Two proprietary brands of copper naphthenate are on the market, 'Cuprinol' and 'Cuprotect', and both give satisfactory results. The green grade of each is preferred and this is diluted with kerosene to give a mixture containing about 3 per cent copper. The air-dry veneers are soaked in this mixture for about two minutes and are then allowed to drain on a rack where they are thoroughly sun-dried. They are usually stored for one to two weeks before use.

To form the tubes the veneers are wrapped round a wooden or metal cylinder with diameter 4½ in. The tube is kept in shape with two pieces of 22-gauge galvanized iron wire with their ends twisted together by hand.

The tube is then removed from the cylinder and passed to the nurseryman for filling.

A handful of teased coir or other palm fibre is placed at the bottom of each tube and then it is completely filled with a good potting compost. This is firmed by some standard method, such as by tapping the full tube twice on to a hard surface, in order to achieve a standard degree of consolidation.

A single cacao seed is then sown in the centre of each tube with correct placement in the normal manner (2).

Transplanting in the Field.

When tubed cacao seedlings are transported to the field they should receive somewhat more careful handling than basket plants, and when lifting them from the ground they should be gripped firmly with one hand, tilted to an angle of 45° and then lifted. As with baskets, they are better stacked tightly in boxes or lorries for transport so that none falls over.

In the field, one tube is placed alongside each planting point and the lower wire ring slipped off and saved for future use. The tube is then placed in the planting hole to the correct depth and the hole can then be re-filled quite firmly with topsoil. The planter then grips the edges of the top of the tube with both hands, gives a sharp jerk and pulls out the tube. If the operation is performed correctly the seedling remains in place, without any root disturbance whatever. Finally, the soil around the plant is firmed by trampling with the feet and the seedling given one good watering if the weather be dry.

Costs.

The cost of making 100 veneer tubes is given below:-

		$
100 wood veneers	..	5.00
Copper naphthenate-kerosene mixture	..	2.80
Wire rings	..	.95
Labour for dipping, drying, construction and filling with compost	..	1.32
		10.07

The cost works out at 10.07 cents each but this could probably be reduced to 9 cents or less by purchasing wire in bulk and using experienced labour.

An untreated bamboo basket costs from 12 to 20 cents, the price at Serdang being rarely less than 18 cents. Hence the average cost of a treated basket is in the region of 19 cents. Admittedly a more dilute mixture of copper naphthenate is used, but a larger quantity of liquid is absorbed by baskets than by veneers.

In practice veneers can be used two or three times. Even though they tend to split before rotting it is usually possible to make up one good tube from two broken ones. This gives an effective cost of about 4 cents as compared with 19 cents for a basket, a very substantial reduction.

Discussion.

The use of untreated plant baskets offers an efficient and easy method of raising and planting cacao seedlings provided that no delay in planting in the field is anticipated. Where seedlings may have to be kept for an extra period in the nursery, then it is recommended that the baskets should be treated with copper naphthenate. There is a slight danger in this treatment in that, where good quality baskets are given too strong a dose of preservative, they may take years to rot away in the soil, thus offering an obstacle to root growth. The remedy is, of course, to use a more dilute preservative and to weave baskets with open-work bottoms. Nevertheless the danger may still exist but this is completely eliminated by using veneer tubes as the planting operation, properly carried out, is an extremely neat and efficient one and seedlings so planted show no check in growth.

Veneer tubes are admittedly somewhat more awkward to handle than baskets in that if a loosely wired one is picked up vertically the tube may slip over the plant and soil cylinder. In practice, however, experienced labourers soon get accustomed to handling them and their low cost makes them particularly attractive where extensive cacao planting is being undertaken.

The various operations are illustrated in Plates I to VIII.

Summary.

The construction and use of wood veneer tubes for raising cacao seedlings is described. These are much cheaper than plant baskets and can be used two or three times.

Seedlings in tubes require somewhat more careful handling than those in plant baskets.

References.

(1) Barnard, R.C. (1954): "A Manual of Malayan Silviculture for Inland Lowland Forests."—Forest Research Institute, Federation of Malaya, Research Pamphlet No. 14.

(2) Whitehead, C. (1954): "Cacao Propagation in Malaya with Special Reference to Cacao Nursery Technique."—*Malay. agric. J*, **37**, 203.

NOTES ON CURRENT INVESTIGATIONS, RESEARCH JANUARY TO MARCH, 1955

Compiled by the Chief Research Officer

Padi.

VARIETY SELECTION.

Analysis of the first year's records of new selection trials shows that at Pahang Tua Padi Test Station all five Serendah Kuning selections from Negri Sembilan significantly outyielded the controls, Radin China 17 and Seri Menjadi. At Telok Chengai Padi Experiment Station, Kedah, 18 Radin Ebos selections have significantly outyielded Radin China 4 and Mayang Ebos 80, and at Jasin Padi Test Station, Malacca, Siam 5356 gave a significantly higher yield than Siam 29 and other new Siam selections.

VARIETY TRIALS.

At Telok Chengai Padi Experiment Station, Kedah, the Burmese varieties D.34/11 and E.30/42 and the Malayan variety Radin Goi significantly outyielded the Burmese varieties C.33/8 and Mly. B.401 and the Malayan variety Haji Haroun, the yields being:-

D.34/11	-	3,468 lb. per acre
Radin Goi	-	2,775 ,, ,, ,,
E.30/42	-	2,761 ,, ,, ,,

Mayang Ebos 80 significantly outyielded Mayang Pasir 28 which in turn was better than Siam 29, M.P.2, M.P.100 and M.P.12.

HYBRIDISATION.

Local Hybrids.

Ear rows of hybrids between local varieties continue to give good yields at Telok Chengai Padi Experiment Station, but are still segregating in F_4. Owing to insufficient junior staff at this station, selection could only be carried out in one third of the F_3 and F_4 progeny plots of these families this season: selection has proceeded normally at Pulau Gadong, Malacca, where supplementary temporary staff was available.

Cuttack Hybrids.

Selection has proceeded satisfactorily at both Pulau Gadong and Telok Chengai. A few lines were lost at Telok Chengai and rather more sterility appeared there this season owing to the early onset of dry weather.

The prospects of experimentation at Telok Chengai in the off-season appear unpromising. An attempt was made to grow a crop of Taiwan padi out-of-season but the reservoir was found to contain only sufficient water for preparation of ½ acre of land and for irrigation supply up to the day after

transplanting. Its estimated capacity of 176,000 gallons is likely to be sufficient to cultivate only about 1/12 acre.

PLANT GROWTH STUDIES.

Mineral Deficiency Symptoms.

A second sand culture experiment has been set up to define symptoms of deficiencies of N, P, K, Ca, Mg, and Fe. Three varieties, Pe Bi Fun, Serendah Kuning and R.S. 34, are being used as field observations indicate that deficiency symptoms may vary from variety to variety. Toxic effects of high concentrations of Fe and Al are also being studied in view of possible relations to *penyakit merah*. So far, no effect on growth has appeared.

Penyakit Merah *Investigations.*

A joint visit by the Senior Soils Chemist and Plant Physiologist was made to Kedah and the soil was examined in 12 areas where *penyakit merah* had been serious in the previous two or three seasons. Soil profile pits were dug and the profiles examined and sampled. So far there is no indication that *penyakit merah* is connected with any particular soil type. The soils examined varied from recent sea clays to very old leached alluvium soils. Analysis of the samples from the profile pits is in progress.

Padi, grown under a series of manurial treatments in pots with soil from areas where *penyakit merah* has occurred, was harvested at the flowering stage and analysed for ash, phosphorus, calcium, magnesium and potassium. The outstanding result from these analyses was the greatly increased uptake of P when the soil had a dressing of phosphorus. This was also reflected in the weight of dry matter harvested from the treatment.

Small manurial trials laid down in Malacca, Province Wellesley and Penang to discover whether *penyakit merah* could be cured by application of different fertilisers gave inconclusive results. Some response to nitrogen and phosphate was observed, and in one case an application of minor elements resulted in improved growth, but the results of these and other earlier trials suggest that the problem is not primarily a soil mineral deficiency though manuring with phosphate has given response.

A case of *penyakit merah* in the Tanjong Karang area of Selangor was investigated. The trouble appeared to be due, in part at least, to impeded drainage, but off-season drainage was excellent in many affected localities in Kedah.

PEST CONTROL.

Stem Borers.

Preliminary studies by the Entomologist in Krian on the carry-over of borers in the off-season revealed great difference between various areas in the type of weed growth. Self-sown padi plants appeared to be the major off-season hosts, but two species of borers (*Chilotraea polychrysa* Meyr. and *Sesamia inferens* Walk.) were found in the sedge *Cyperus digitatus*.

A small randomised block plot experiment using dieldrin at the rate of 1 lb. per acre is showing promise both in reduction of borer attack and higher yield, especially when spraying was done six weeks after transplanting.

Pianggang.

Very encouraging results were obtained in Kelantan against the padi bug *Leptocorisa acuta* Thnbg. by means of fogging, using 1 part of 25 per cent DDT to 3 parts of Sovacide PYD released from a "Swingfog." A satisfactory kill was demonstrated in this way against the bug which is active enough to move out on to the narrower target areas covered by knapsack sprayers or rotary dusters. About one gallon of insecticide per two acres is consumed in one hour's actual fogging time.

Disease Control.

Seed Treatment.

Pot tests with organic mercurial seed dressings are continuing. Those in progress are designed to discover whether treatment is most effective before or after soaking the seed and also whether dusts are more effective than liquids.

Cacao.

Selection and Breeding.

Trinitario Selections.

The number of preliminary selections based on yield and pod value has been increased to 48 and cuttings of these have been taken for multiplication in Field 45A, Federal Experiment Station, Serdang, and cross and self pollination of selected trees has continued.

Altogether, 80 buds of I.C.S. 60 have been despatched to Jerangau Estate.

An exploratory experiment to compare dry bean extraction with and without fermentation showed that the effect of fermentation varies with different genetic material, and should therefore be carried out in assessing pod quality for selection.

Pest Control.

A new type of damage to cacao trees has been seen in which the bark of the trunks is attacked by the caterpillar of a clearwing moth (Aegeriidae), probably a species of *Conopia*. Branches are less frequently injured in the same way and half-grown pods, previously damaged by *Helopeltis*, have also been found bored by the caterpillars. This is a new pest, confined so far to the Federal Experiment Station, Serdang, and control measures are being investigated. A Hymenopterous parasite has been reared from the larva.

Fermentation.

A number of single pod fermentations have now been completed, and will be carried through to the "chocolate test" stage when better grinding facilities are available. Flavour-free cocoa butter is being prepared for these tests.

Apparatus is in course of construction to enable the Chemistry Division to run multiple micro-fermentation under uniform conditions, so that better comparisons can be made between selected material.

Oil Palm.

Pest Control.

The outbreak of the bagworm *Cremastopsyche pendula* Joannis on an estate in Perak was investigated further. It is estimated that these bagworms caused an annual loss of ½ ton of fruit per acre in badly attacked fields. A number of Hymenopterous parasites were present. The bagworm population has been much reduced following on dusting with calcium arsenate at 15 lb. per acre, but whether the present recovery of the palms is due to control by parasites, natural fluctuation in bagworm population, as seems possible, or to the effects of the calcium arsenate, is not determined.

Extraction and Processing.

A test extraction was made to examine the unsaponifiable fraction of the pericarp residue oil (palm fibre oil), which is very rich in carotenoid pigments. Tests carried out by the Department have confirmed results, published in France, showing that the selected estate palms have residues low in carotene, and the fibre oil is of very low stability, rancidity developing rapidly.

Following the examination of selected samples of palm kernels from an estate near Klang, a series of experiments was initiated to study the effect of process conditions, as applied to pericarp oil extraction, on the quality of the kernels subsequently extracted, together with the improvement, if any, which can be made by nut steaming, kernel drying, etc. This work is in progress.

Pineapple.

Chemical Studies of Pineapple Fruit, Leaves and Products.

This work is still in its first year, and no further conclusions can yet be made. Analyses have continued on fruit from field experiments SEL.98 and SEL.114. Smooth Cayenne products from the cannery in Perak have been analysed.

Canning Research Station.

In the absence of a Canning Officer, the quarter's work has been of a simple nature. A programme of work, pending the arrival of a Canning Officer, was laid down as follows:-

(i) Continuation of examination and canning of fruits ex-Federal Experiment Station, Alor Bukit, Johore.

(ii) Preparatory stages of trials in harvesting and transport of fresh pineapples.

(iii) Completion of examination of experimental packs re "paraffin" off-flavour carried out at the Lee Pineapple Factory.

(iv) Trial canning of banana varieties.

Pest Control.

Mealy-bugs.

A field test has been set up to see if, in virgin land, pineapple plants, after fumigation with methyl bromide and spraying of the soil with Dieldrex 15 at 1/100, will remain free from mealy-bugs. As controls, this test will have unfumigated slips and unsprayed soil; observations are planned to run for at least three years.

Disease Control.

Fruit Rot.

Considerable progress towards the elucidation of this disease has been made during the quarter. It has been found that typical symptoms of the disease can be produced by inoculating a species of bacterium isolated from diseased fruits on to healthy fruits; the disease is thus shown to be bacterial in origin and provisional control measures can be formulated.

Work is continuing on the identification of the causal bacterium. Further isolations from diseased fruits will be made when the disease again appears in the field, in the next fruiting season, to discover whether the disease is always caused by the same species of bacterium.

Observations were made in the Pontian area of Johore to see if the disease may have been carried by an insect vector. Three beetles were found generally associated with ripe fruit, viz. the Cetoniid *Glycyphana sinuata* Wall. and the Nitidulid *Carpophilus* sp. near *foveicollis* Murr. and *Haptoncus ocularis* Frm. Nothing has been found to indicate that any of these beetles are vectors of the disease. The observations will be continued during the harvesting season.

Heart Rot.

Work on this bacterial disease of young plants has been recommenced. Typical symptoms of the disease have been produced by inoculation with the bacterium causing fruit rot, which suggests that the two diseases may be caused by the same bacterium. Work on this aspect of the problem is continuing.

Tea.

Pest Control.

A mite, identified by the Commonwealth Institute of Entomology as the pink mite, *Acaphylla steinwedeni* Keifer, was reported from leaves of tea bushes at Cameron Highlands. This is the first time this mite has been recorded in Malaya, though it has been recorded in India and California.

Fibres.

Disease Control.

Mauritius Hemp.

A further investigation of the basal leaf rot occurring at the Federal Experiment Station, Serdang, has been carried out. Again, no parasitic organism could be found associated with the disease.

At the Federal Experiment Station, Jalan Kebun, a somewhat similar rot has recently been observed. This appears to be bacterial in origin.

Soils Investigations.

PADI.

Soil Survey, Trans-Perak Area.

This soil survey has been completed and a report—"Soil Survey of the Trans-Perak Swamp. Description of the Soils with a Discussion on the Suitability of the Area for Agricultural Development with Particular Reference to Padi"—has been issued in cyclostyled form. A map showing the distribution and depth of peat, and the distribution of mineral soils suitable for padi has been prepared, as has also a map showing the vegetation types, i.e. jungle, scrub, padi land, etc. These accompany the report.

Soil Survey, Kuala Langat.

Soil sampling has continued in the Kuala Langat (North) Forest Reserve. The recent observations confirm the earlier findings, i.e. that a large area of deep peat is present.

Soil Survey, Briah.

Chemical analyses of the samples taken during the course of this survey have now been completed and a map showing the distribution of peat and its depth has been prepared.

Soil Survey, Kedah.

A soil survey of the Kedah Plain was started at the beginning of February. In this area the prolonged dry season results in the water table falling four feet or more, so that examination and sampling of profile pits is possible. This is in contrast to many other padi areas, where the water table seldom drops more than one foot below the surface.

The basis of classification of the padi soils is on the visual characteristics of the soil profile. As a preliminary to systematic field survey, some 70 to 80 pits were dug at intervals of about three-quarters of a mile along east-west lines and approximately five miles apart to give a broad coverage of most of the Plain. From these observations, Kedah padi soils were provisionally classified into 17 groups, the classification being based on observed differences in structure, consistence, nature of iron deposits, etc. It is probable that, as the survey progresses, some extension and modification may be necessary, but the provisional classification forms a working basis for the systematic soil survey now in progress.

Experiment with Various Soils in Tanks.

In the tanks filled with peat from Jalan Kebun, Selangor, remarkably good growth was obtained, both on the raw peat and on that which had been cultivated. Contrary to expectation, the plants bore a good crop of grain. This fact certainly needs further investigation because in the field

very poor padi is generally found on peats. Measurements of pH were taken and did not show anything out of the ordinary.

The improved growth may be due to the fact that pure water was supplied from taps in contrast to the usual highly acid, peaty water which padi would receive under field conditions.

OTHER CROPS.

Soil Survey, Trengganu.

The soil survey work carried out in this State in 1954 has been written up in two cyclostyled reports, viz. Reconnaissance Soil Survey of the Marang, Ajil and Bukit Payong Areas, Trengganu (Topo Sheets 2 L/13 and 14), and 1954 Reconnaissance Soil Survey Report on Areas Suitable for Cacao (Ulu Chalok and Jerangau Road Areas). Maps accompany these reports.

Food Storage.

Following a request from the Government Committee on Long Term Storage of Foods, work has started on a storage experiment for sugar in sealed polythene bags. At the end of the quarter, preliminary work on technique, bag-making, etc., was completed. It is expected that this experiment will be concluded by about September or October, 1955.

NOTES ON CURRENT INVESTIGATIONS, AGRONOMY JANUARY TO MARCH, 1955

Compiled by the Senior Agronomist

Padi.

The harvest was almost complete at the end of the quarter in all States and Settlements except Selangor and parts of Johore and Pahang. In most localities harvesting was greatly facilitated by very dry weather, but this came too early for maximum yields in parts of north Kedah and Perlis.

Yields have varied greatly from place to place. In south Kedah, the small station at Pulai averaged 830 gantangs per acre, yet a fertiliser response of over 100 gantangs per acre was reported. In the same region, at Rantau Panjang Padi Test Station, the average yield was 480 gantangs per acre in spite of damage from *penyakit merah* earlier in the season.

A green-manure and fertiliser trial was laid down at harvest time at six localities with germinated seed of *Sesbania aculeata* being broadcast into the standing padi crop one week before harvest. Fairly satisfactory growth has been recorded at Telok Chengai, in Kedah, Ulu Klawang, in Negri Sembilan, and in Malacca but crops elsewhere have failed as a result of drought.

A small proportion only of experimental results have been received from agronomic trials and statistical analysis is in progress. It has been noticed that, at Padang Kemunting, Trengganu, quite a good crop has been harvested from deep peat, responses from burning and phosphatic manuring being most marked, yields from plots receiving both treatments averaging 1,800 lb. per acre.

Cacao.

The site for an important factorial manurial trial of Amelonado has been under-brushed, lined, holed and thinned in readiness for field planting at the Federal Experiment Station, Jerangau, in Trengganu. Basket seedlings for this experiment are almost ready for planting out in the field.

In a seedling transplanting and type of nursery experiment at the same locality the first sowing, in October, 1954, has had to be abandoned because the 'hard' nurseries failed. The second series of nurseries, which were sown in December, have been more successful and both 'hard' and 'soft' seedlings are thriving. The 'hardness' of the former was slightly modified by setting palm fronds vertically throughout the seed-bed.

In a lime-phosphate experiment, planted last September, growth in the field has been outstandingly vigorous and so far generally uniform.

At the Federal Experiment Station, Serdang, where most of the field experiments are testing different varieties and progenies, the standard of upkeep has been high. Outbreaks of mealy bugs have been controlled by white oil spraying while sporadic and occasionally serious attacks by *Helopeltis theobromae* have been efficiently controlled by fogging with D.D.T. using a 'Swingfog.'

Experience with the use of veneer tubes has shown that these can be used for raising cacao seedlings but that they are somewhat more awkward than baskets to transport in the field. However, veneer tubes have the advantage of cheapness and the transplanting operation is a very neat and efficient one.

A heavy crop is now being harvested from Serdang cacao fields and a large proportion of this is being used for fermentation as it is surplus to seed requirements. It is significant that on the first occasion that the fermenting box was filled to capacity the temperature of the beans rose to 120°F (49°C) which should give satisfactory results. Each box has a capacity of 11 cu. ft., or about 500 lb. of wet cocoa.

The spray-propagator at Serdang has been renovated and improved and is now in use for the propagation of new botanical selections. A total of 424 cuttings of 53 selections have been rooted for the Botanical Division.

A small field of cacao which was planted under mature oil palms at Ayer Hitam, Johore, has now been judged a failure. Initial growth of cacao was very promising but has now practically ceased. This result confirms experience at Serdang where Criollo cacao was planted under oil palms but failed to grow in spite of very generous manuring.

On one estate in north Selangor, Trinitario cacao has grown moderately well under old coconut palms and it is now proposed to establish a block of West African Amelonado. Intermediate shade of *Erythrina subumbrans* has already been established and cacao nurseries sown. On a nearby estate in south Perak, Amelonado cacao is growing well under mature, tall and dwarf coconuts aged about 25 years. It is only with older palms of over 40 years that the intermediate shade appears to be necessary.

Coconut.

Work has commenced on clearing 46 acres at the new Federal Experiment Station, Telok Bharu, in south Perak. This will be devoted almost entirely to coconuts.

Oil Palm.

In a replanting and manuring trial at Serdang, extensive leaf yellowing appeared early in the year and each palm was given an application of 6 lb. of Kieserite, i.e. commercial magnesium sulphate. There has since been some improvement in appearance.

Fibres.

Mauritius hemp is proving to be an expensive crop to maintain on poor soil at Serdang. There has been some premature poling, particularly in the thorny variety, but the plants are still too small to be harvested.

Tea.

In a nitrogenous manuring experiment on highland tea at the Federal Experiment Station, Cameron Highlands, the average increment of made tea per 1 lb. nitrogen, as sulphate of ammonia, worked out at 1.575 lb. in the

third year of the first pruning cycle. Mean yields of green leaf and calculated yields of made tea are summarised below:—

	N_0 No N.	N_1 40 lb.N.	N_2 80 lb.N.	N_3 120 lb.N.	S.E.
Green leaf (lb.)	2,883	3,239	3,363	3,745	±36.4129
Made tea (lb.)	634	713	740	824	

This particular trial will be continued for another two pruning cycles.

Pineapple.

At the Federal Experiment Station, Jalan Kebun, Selangor, the second harvest yields in a rate of potash trial have shown an increasing yield of Singapore Spanish fruit with increased rates of potash application up to 150 lb. K_2O per acre per year. Results for the Sarawak variety were uneven.

In a ridging and spacing trial with the Singapore Spanish variety there was no difference in fruit size between treatments but the best yield came from the closest spacing, i.e. 2 x 2 ft., 4 ft. apart.

There is some evidence that nitrogen, when applied to Sarawak pines spaced 6 x 2 ft., causes excessive vegetative growth which often leads to lodging. Closer spacing seems to be beneficial with this variety.

Trials with the application of nutrient sprays to pineapples are continuing. Remarkably high concentrations of fertiliser can be used without causing scorch provided that potassium chloride is not used. Suitable mixtures have been made up from urea, sulphate of ammonia, potassium nitrate and mono-ammonium phosphate. The relative efficiency of applying fertilisers in spray form as compared with soil applications is not known but it is likely to have practical application where the Mauritius variety is grown on sandy soils for the fresh fruit market.

An area of 10.8 acres has been planted up at the same Station with the Singapore Canning variety at a spacing designed to permit mechanisation.

In a replanting experiment on an estate in south Johore the incidence of fruit rot continues to be high and this disease is undoubtedly very serious in some localities. A number of other co-operative trials in this area were affected by floods but the crop is now recovering.

Vegetables and Foodcrops.

In the long-term manurial trial at Cameron Highlands designed to compare prawn dust with Sterameal and bean cake mixtures, the first crop, cabbage, of the third cycle has shown differential attack by bacterial disease. This disease appeared two weeks after application of the second half of the fertilisers, the casualties being as follows:—

Prawn dust	-	47.2	per cent
Sterameal	-	54.8	,, ,,
Bean cake	-	6.9	,, ,,

In a comprehensive cabbage variety trial, also at Cameron Highlands, Jubilee hybrid again gave the best yield but the hearts contained hollows

to which dealers objected. The highest yielders acceptable to dealers were Yates' Allhead and Sutton's Eclipse Drumhead.

Three new cauliflower varieties alleged to be suited to the tropics have been tested at Kuala Lumpur. These are Snowdrift 14 and 16 and Pua Kea. Under somewhat poor growing conditions, due to heavy rain, none showed promise nor equalled the performance of established Indian varieties. The trial is to be repeated in drier weather.

The last two crops in a long-term rotation experiment have given very disappointing yields largely due to heavy rain after sowing maize and groundnuts.

Some of the Jamaican and Bahamas strains of pigeon pea now being cultivated in Kuala Lumpur have given fair crops of large beans but there appears to be little interest in this as a green vegetable.

Fruits.

Both the durian and rambutan variety trials at the Federal Experiment Station, Serdang, cropped early in the year. An attempt was made to introduce legumes into the grass cover by discing, sowing inoculated seed of creeping covers and rolling but the stand of legumes so obtained was a poor one. More thorough cultivation would have been undesirable because of possible danger to the tree roots.

Fruits from the durian clone D.8 have been judged inferior by a tasting panel so this clone will be withdrawn from propagation until it can be re-tested elsewhere.

Modified manurial mixtures have been applied to these trials with a view to increasing cropping.

The banana museum has been clean-weeded and several new varieties have been added to it.

Polythene strip has been found to be inferior to raffia in budding tests at Serdang. The thin grade, 0.0015 in. thick, is superior to thicker grades.

Scabs on guava fruit are thought to be caused by *Helopeltis* sp. and it has been established at the Federal Experiment Station, Kuala Lumpur, that attack can be prevented by fortnightly spraying with wettable D.D.T., thus producing clean fruit.

Fodder Grasses.

Six strains of Guinea grass, *Panicum maximum*, have been imported as seed from East Africa and have been established in observation beds at the Federal Experiment Station, Kuala Lumpur. Some of these are very leafy and show promise of much vigour.

Pastures.

Growth of the grasses has been luxuriant in the shade and variety trial. The shade trees of *Enterolobium saman* are thriving and are just beginning to form a closed canopy. Lalang (*Imperata Cylindrica*) is increasing

in all the unshaded plots whereas *Axonopus compressus* is showing signs of becoming dominant under shade.

The yields of fresh cut grass from a factorial manurial experiment have recently been summarised for the three years 1952 to 1954 inclusive. Phosphate has had no effect on yield whereas the responses to nitrogen and potash were both linear. The N_2K_2 fertiliser dressing increased the yield of fresh cut grass from 31,800 lb. (14.2 tons) per acre per annum to 49,120 lb. (21.9 tons) per acre per annum. This particular annual dressing consists of 4 cwt. sulphate af ammonia and 2 cwt. muriate of potash per acre.

It has now been decided to double the N and K dressings and to halve the P ones. At the same time a pilot test has been planned to determine if yields can be recorded as liveweight gains of sheep.

Horticulture.

It has been established at the Federal Experiment Station, Serdang, that the John Innes Seed (J.I.S.) and Potting (J.I.P.) Composts are the most efficient ones for commercial use for raising seedlings. Recently an investigation has aimed at finding a suitable substitute for horticultural peat as this is not obtainable in Malaya. Materials tested were:-

coir dust,
Manila hemp dust,
weathered tropical peat topsoil, and
weathered tropical peat subsoil.

Both the peats were superior to coir dust and vastly superior to Manila hemp dust. Peat subsoil from a depth of 12 to 24 in. is preferable to topsoil as it is relatively weed-free. The J.I.S. compost is preferred for normal use but the J.I.P. one should be used when seedlings may have to be retained in boxes beyond the normal pricking out stage. These composts are given below:-

J.I.S.

2 parts	-	steam-sterilised, fibrous, medium textured, jungle loam of pH corrected after steaming to 6.5.	1½ oz. single superphosphate plus ¾ oz. ground limestone per bushel.
1 part	-	weathered, tropical peat subsoil.	
1 part	-	sharp sand.	

J.I.P.

7 parts	-	steam-sterilised jungle loam, as above.	¼ lb. of J.I. fertiliser base plus ¾ oz. ground limestone per bushel.
3 parts	-	weathered tropical peat subsoil.	
2 parts	-	sharp sand.	

MECHANISATION

Half-Yearly Report, October, 1954, to March, 1955.

Compiled by the Agricultural Engineer

Recent Importations.

The following new implements and machines have been received:-

Three types of 'Shinkogo' animal-draft ploughs,

A 'Rajah' thresher,

A Bissett semi-mounted binder,

Ferguson mounted disc harrows,

An 'Ebara' 100 SAB centrifugal pump, and

A 'Noto' bird and animal scarer.

The following machines were loaned to the Department of Agriculture by the local agents for observation trials:-

Allis-Chalmers Model 'B' tractor.

Caldwell S2 rotary brush cutter.

Tests and Modifications.

THE PLATYPUS BOGMASTER TRACTOR.

Further tests were conducted with the Platypus Bogmaster tractor but satisfactory test sites could not be found in the peat areas near Serdang, Selangor. Field work was undertaken on an oil palm estate at Batang Berjuntai, where the peat was dry and firm and conditions unusually good, and on a flooded smallholding at Sungei Burong, where conditions were extremely difficult. The tractor was damaged at the latter site and the tests could not be continued. A report on these tests has been prepared.

THE ALLIS-CHALMERS MODEL 'B' TRACTOR.

An Allis-Chalmers Model 'B' wheeled tractor was loaned to the Department during December, 1954.

The tractor, which was powered by a Perkins P3 (TA) 3-cylinder diesel engine said to develop 25 h.p. at 1,500 r.p.m., was fitted with 10 x 24 water-ballasted tyres in place of the 9 x 24 tyres which are standard equipment. The driver was comfortably seated and had an excellent view in all directions: the tractor felt somewhat unstable because of the high seat and small wheels but appeared to be quite safe when working across steep slopes. The controls were conveniently placed, except that the foot-operated, electric starter pedal could not be reached from the seat by Asian operators, and the clutch and brake pedals were narrow and uncomfortable for bare-footed operators. This tractor has a top speed of some 12 m.p.h., but the independent steering brakes could not be clamped together to ensure safe braking at high speeds. The voltage regulator was mounted on a bracket on the side of the engine and a simple shield would be necessary when working in secondary jungle or scrub: the sump was protected to some extent by the front axle. The hydrau-

lic power lift, which is an optional extra, has an external cylinder and can be used to operate a three-point linkage.

The tractor was used to tow a Caldwell S2 rotary brush cutter on various sites at the Federal Experiment Station, Serdang. It performed well and was simple to maintain, but it was not possible to try the tractor under typical estate or smallholding conditions and no report has been prepared.

Investigations into the Cultivation of Wet Padi.

Trials of mechanical harvesting equipment have been carried out in Kedah, Malacca, Kelantan and Pahang, and a thresher has been sent to Perak for observation trials.

The Massey-Harris No.80 Self-Propelled Rice Special Combine was again used in Kedah but the acreage harvested was disappointingly low because the harvest season was unusually short coupled with the fact that the combine was unserviceable for over a week because of a major mechanical failure. The Andro thresher (Rayat prototype) was used in Kedah and Malacca and worked very well, giving outputs of about 750 lb. of grain per hour with a crew of four men. The Rajah thresher, which is a larger version of the Rayat prototype, arranged for semi-mounting on a Ferguson tractor, arrived late in January, but a very brief trial was possible in Kedah: the thresher appears to be very promising, although a few modifications may prove to be necessary.

The Opperman baler was used successfully in Kedah and Kelantan, the straw being collected by a tractor-mounted buckrake in the former State.

Investigations into the Mechanised Harvesting of Dry Padi.

The Bisset semi-mounted binder and the Rajah thresher were used to harvest dry padi at Paya Besar in East Pahang. A few mechanical failures occurred but the work was straightforward and no real difficulties were encountered.

Investigations into the Cultivation of Dry Land Crops.

THE CALDWELL S2 BRUSH CUTTER.

The eradication of scrub cover and the control of weed growth and cover crops is an important aspect of estate husbandry. Conventional cultivation implements, such as the disc harrow, are not satisfactory since they leave the soil bare, encouraging erosion and possibly the loss of organic matter from the soil. The normal type of commercial reciprocating cutter bar, designed for mowing hay, is incapable of cutting down dense growths of weed or scrub but rotary cutters of rugged construction may prove suitable in certain conditions. An American machine of this type, the Caldwell S2 brush cutter, was loaned to the Department of Agriculture by the local agents during December, 1954, and was used for a short time at the Federal Experiment Station, Serdang.

The Caldwell cutter is a trailing, power-take-off-driven machine mounted on a pair of pneumatic-tyred wheels. The vegetation is cut and shredded by an alloy steel blade which rotates, parallel to the ground, at

about 600 r.p.m. The blade is driven through a right-angle gear-box from the tractor's power-take-off shaft and the height of cut can be controlled by adjusting the cranked axles on which the wheels are mounted. The relationship of the drawbar and power-take-off shaft is unusual and, although the cutter could readily be hitched to the Allis-Chalmers Model 'B' tractor it is thought that some difficulty might be experienced with certain other makes of tractor.

The Caldwell cutter was used to control a heavy growth of Straits Rhododendron (*Melastoma malabathricum*) under abandoned oil palms at the Federal Experiment Station, Serdang. The cutter worked extremely well on rough land, where the bushes were up to 6 ft. tall, and could cut through stems up to 2 in. thick: the vegetation was reduced to small fragments which were scattered evenly over the surface. No timed trials were made in the abandoned oil palms because the areas available were small and irregular, but a working rate of 2.9 hr. per acre was recorded when cutting a dense growth of grass and *Mimosa pudica* under coconuts. It is estimated that the cost of cutting will vary between $8 and $13.50 per acre, depending on the density of the vegetation and the type of land.

Bird and Animal Scarers.

The protection of food crops against the depredations of wild animals and birds is a difficult problem on many types of agricultural holding, especially on Agricultural Experiment Stations where accurate recording of yield is essential. Trapping and poisoning the pests is rarely completely effective, and shooting, at least so far as nocturnal animals are concerned, is seldom possible in Malaya today. The use of automatic scarers, which produce a noise (usually an explosion) at fixed or irregular intervals, is one method by which crops can be protected.

The 'Noto' Bird and Animal Scarer.

A number of 'Noto' bird and animal scarers were received during February, 1955, and were tested at the Workshop and Pool, Serdang, before being issued for routine use on Experiment Stations.

The 'Noto', which is manufactured in Japan, produces loud explosions by igniting a mixture of acetylene (produced by the action of water on commercial calcium carbide) and air. The acetylene is produced in a cast iron container with a removable water tank. An adjustable valve and nozzle in the base of the tank affords some degree of control over the intervals between explosions. The top of the container, which is clamped tightly in place by three thumbscrews, is fitted with a rubber diaphragm which is held in tension by a spring-loaded plunger. As the gas pressure within the container rises, this rubber diaphragm lifts the plunger which, at the top of its stroke, trips a simple valve, allowing the gas to flow from the container to a sheet-metal explosion chamber through a simple jet where the gas is mixed with the appropriate amount of air. The rising plunger also cocks a spring-loaded flint-and-steel mechanism which produces a spark to ignite the gas/air mixture in the explosion chamber.

During preliminary tests it was found that the threads of the thumbscrews and studs used to secure the top of the container were very badly formed, and it was difficult to ensure that no leaks occurred at the joint, especially since the face of the container was somewhat rough. Any gas leaking from the joint was ignited by the explosion issuing from the base of the chamber and the burning gas soon burnt the rubber sealing ring, aggravating the leakage. New thumbscrews and studs have been fitted to all the 'Noto' scarers owned by the Department and they are now reasonably gas-tight, but it is clear that the container must be handled carefully to avoid burning or cracking the face.

The flint-and-steel mechanism was found to be sensitive to moisture, so the 'Noto' scarer must be protected from rain. As a temporary measure, the scarers are being placed under simple bamboo shelters, but various designs of hoods are being tested in an attempt to find a cheap, simple and portable method of protecting the mechanism from rain. None of the types so far tested has been satisfactory, either because they are eventually blown to pieces by the explosions or because they give inadequate protection, but it has been noted that a simple double cone, mounted above the explosion chamber, appears to intensify the noise produced by the scarer.

The manufacturers state that the container will hold 1 lb. of commercial carbide (costing 26 cents in Kuala Lumpur) which will produce sufficient gas for 120 explosions and that the valve in the water tank can be adjusted to give any desired interval between a few seconds and twenty minutes. In practice, however, it has been found difficult effectively to control the rate of flow, and the interval between explosions becomes progressively shorter at any particular setting since free water collects in the container. It has also been found that the amount of carbide which can be placed in the container is limited since frothing occurs and the nozzle in the water tank becomes choked. During routine use at the Federal Experiment Station, Serdang, it has been found that a flint may be expected to last for two nights and the rubber tubing, which forms the gas valve, for four to six nights.

The 'Loosco' Bird and Animal Scarer.

A 'Loosco' bird and animal scarer belonging to the State Agricultural Officer, Pahang, was inspected during a visit to Kuantan Agricultural Station.

The 'Loosco' is similar in principle to the 'Noto' scarer, although two explosion chambers are provided to produce explosions at irregular intervals and a different method of producing and igniting the gas/air mixture is employed.

The gas producer of the 'Loosco' scarer resembles the laboratory Kipps apparatus: the carbide is placed in a large can which is inserted inside a bell-shaped housing and lowered into a bucket which has been filled with water to the correct level. The gas passes from the bell-shaped housing to a pair of jets, resembling Bunsen burners, where it is mixed with the correct proportion of air before entering the two explosion chambers. A simple ceramic burner is mounted on the top of the bell-shaped housing so that

it's flame impinges onto a pair of pipes leading from the top of the explosion chambers: when the chambers are full, the gas/air mixture leaks from these pipes and is ignited by the flame, initiating the explosion within the chamber.

This scarer, which is manufactured in Holland, is well made and heavily galvanized. Charging is very simple indeed since there are no screws to be removed or seals to be replaced. The burner, which is protected from wind and rain by a heavy shield, has no wearing parts and occasional cleaning is the only maintenance required.

The explosion produced by the 'Loosco' appeared to be somewhat less noisy than that of the 'Noto', but it was not possible during a short visit to verify the makers' claim that the two chambers produce irregular explosions.

NOTES ON EXTENSION WORK JANUARY TO MARCH, 1955

Compiled by the Acting Chief Field Officer

Padi.

Most parts of Malaya experienced exceptionally dry weather during the first quarter of the year. Kedah, for example, suffered the most severe drought for 20 years, the total rainfall recorded at Telok Chengai Padi Experiment Station being only 1.22 in. during the three months. The dry weather had an adverse effect on yields in the north-western States where the padi, being the first to mature, suffered from unfilled grains. Further south, however, the dry weather coincided with harvesting operations which were, therefore, carried out in ideal conditions without the accompanying reduction in yields. Good yields are anticipated from Perak, Selangor, Negri Sembilan, Malacca and South Johore, although harvest is not yet complete and final figures not available.

Early indications from the 1,629 extension manurial trials, which are being carried out in most States and Settlements, are that manured plots have noticeably outyielded unmanured ones and have created a very favourable impression with the owners of the land on which the trials are being carried out. Similarly, in the 866 extension varietal trials, selected varieties are proving superior to the unselected local varieties and many of the cultivators have stated their intention to continue and to extend their planting of selected varieties in the next season.

As a result of the reduction in the Government support price of padi from $17 to $12 per picul and the alleged hardships which resulted therefrom, Government appointed a Federal Rice Committee to investigate conditions and put forward recommendations for their improvement. The State Agricultural Officers, Kedah and Perlis, Perak, and Kelantan were appointed State representatives on this Committee, and on-the-spot investigations were carried out in Kedah and Perlis. In Kedah and Kelantan, simple economic surveys were conducted by the State Departments in the main padi growing areas in order to provide factual information for the Committee.

One result of the reduction of the Government's support price has been that less money was available for the purchase of fertilisers, and it is reported from Kedah that there has been a reduction to about 30 per cent in the orders for bat guano with the main distributing agent.

An outbreak of padi bugs (*Leptocorisa* sp.) in Kelantan was effectively controlled by insecticides using a "Swingfog" fogging apparatus operated by specialist officers of the Research Branch, and the State Department accordingly ordered three units which will be made available to padi planters in the event of future outbreaks. Departmental pest control staff were responsible for distributing 345 lb. zinc phosphide poison, which, mixed with suitable baits such as boiled padi, dried prawns, etc., is extensively used by padi planters for rat destruction.

Totals of 1,238 gantangs of selected padi seed and 39,716 gantangs of unselected seed were distributed from Departmental sources.

Rubber.

The seedfall which occurred during the first quarter of the year resulted in the collection of 6,279,383 seeds, more than 6,000,000 of which were from Selangor, and, such was the intensity of the fall that in one day alone over 1½ million seeds were handled.

Seeds were distributed by officers of the Department for establishment in clonal seedling nurseries in their respective States and Settlements. Owing to unfavourable weather, establishment was not as successful as that obtained during the seedfall of the latter months of 1954.

The total number of seeds collected and distributed during the current season is 18,612,027, which is greatly in excess of the numbers handled in any previous season.

The Rubber Industry (Replanting) Board were supplied with 236,116 clonal stumps and 23,809 yards of approved budwood from Departmental sources during the quarter, representing planting material valued at $41,370.

In addition, 69,735 clonal stumps and 13,845 yards of budwood, of a combined value of $13,920, were distributed for new planting, so that the total value of rubber planting material produced and distributed during the quarter exceeded $55,000.

Fruit.

A feature of the extension work on fruit during the quarter was the very large increase in the number of stock seedling nurseries, for future budding with approved clones, laid down on Agricultural Stations throughout the country. This increase is largely occasioned by the necessity to make adequate provision for the supply of approved fruit planting material where fruit trees, as an alternative crop, have been approved under the Smallholders Rubber Replanting Scheme.

Actual distributions of budded fruit plants during the quarter were restricted in certain States and Settlements due to unfavourable weather for planting out, but, nevertheless, a total of 12,903 plants was sent out. Those Agricultural Stations where irrigation systems have been installed for their fruit seedling beds suffered fewer casualties from the drought by comparison with those not so equipped.

In addition, 1,930 fruit seedlings, 1,278 shade trees, 20,181 coffee seedlings and 1,000 Manila hemp suckers were distributed, apart from numerous miscellaneous items of planting material such as pepper cuttings, *Stylosanthes* cuttings, flowering shrubs, orchids etc.

In Perak, *kampong* fruit nurseries in Larut and Matang District have been given assistance by the Department in the form of advice, demonstrations and the supply of budwood.

It is reported from Johore that 13 smallholders in Muar are running fruit nurseries for the commercial production of budded plants and that maintenance work, including regular manuring, has been good.

In Johore also, a Chinese smallholder, after felling his rubber prior to replanting, took a catch crop of water melons which brought him in a return averaging $600 per acre.

Cacao.

A number of State and Settlement cacao seed gardens in the early stages of establishment were adversely affected by the dry conditions prevailing, but those which had been longer established made good progress, particularly at Sungei Tong in Trengganu.

At Petasseh, in Negri Sembilan, sufficient pods were received to complete the planting up of the 8-acre Amelonado seed garden.

Pineapple.

In Perak, 150,000 suckers were obtained by the Department and distributed to growers for the Kampong Selabak Pineapple Scheme, and in Selangor, 80,000 suckers were supplied to smallholders in Sekinchang. At Sekinchang also, enterprising Chinese have interplanted an area of 10 acres of pineapples with tomatoes, and a very profitable return is expected. Interest has been aroused in the planting of pineapples in the peat areas of Kuala Selangor, but the anticipation of difficulties in transporting the crop out of the area restricts progress.

A Co-operative Society has been formed near Muar, Johore, for the proposed planting of 500 acres of pineapples by Malays, and the Department has arranged to establish a demonstration plot in the area.

Coconut.

In Selangor, sanitation campaigns were continued on smallholdings with good results; for example, in Kuala Selangor District the incidence of Rhinoceros Beetle damage had previously brought about a reluctance to plant coconut, but the present interest in this crop reflects the success of control measures.

In Johore, funds for the establishment of a coconut rehabilitation station in Muar District have been made available by the State Government and action is in progress to acquire the necessary land.

Hill Vegetables.

In the Bertam valley of Cameron Highlands, demonstration plots of two varieties of English cabbage showed that damage by caterpillars of the Diamond Back Moth can be satisfactorily controlled by spraying with a suitable insecticide and that it is an economic operation.

Similarly at the same site, it was successfully demonstrated that the disease caused by *Colletotrichum lindemuthianum* can be controlled economically on climbing beans by spraying with a copper fungicide. Local vegetable growers were enthusiastic about the clean appearance of the beans and the complete absence of black spotting; they were also attracted by the, to them, new variety "Canadian Wonder" and placed orders with the Department for more than a pikul of seed.

Mechanisation.

Complaints have been received in Province Wellesley that the contract rates for mechanical land cultivation charged by private contractors are too high; the Settlement Department is watching the situation and will intervene if necessary.

A demonstration of mechanical harvesting and threshing of padi was given on a four-acre holding in the land development scheme at Paya Besar, Pahang. Harvesting was completed in about five hours and the swift, efficient handling of the crop, as compared with normal harvesting methods, provided a lesson which greatly impressed the onlookers.

Livestock.

Pigs.

The demand for pure-bred Middle White breeding stock continued to increase and a total of 72 boars and 67 gilts were sold from Departmental stud centres, the majority from Cameron Highlands.

Poultry.

In continuance of the policy to supply pure-bred stock on demand, 870 cockerels, 811 pullets, 1,467 chicks and 4,064 hatching eggs were distributed during the quarter.

Goats.

Ten bucks (Imported x Local) bred at Departmental Stations were distributed but the demand for stud animals continued to exceed the ability to supply.

Manures and Fertilisers.

A local fertiliser marketed under the name of "Dried Sewage Sludge" was found to be in use among vegetable gardeners in Cameron Highlands and the Agricultural Development Officer-in-Charge, doubting its manurial value, sent samples to the Senior Chemist, Department of Agriculture, for analysis, the result of which showed little if any value as a fertiliser. Local farmers have been informed of the situation and advised against wasting their money on this product.

New Villages.

Departmental assistance was given in the clearing of 75 acres of wet padi land at Parit Keliling, Malacca. Initial clearing by a Departmental bulldozer at the new village at Kahang, Johore, was followed by after-cultivation with wheeled tractors. Assistance was given to new villages throughout the country, mainly in the form of supplies of planting materials.

In Kelantan, an Agricultural Assistant was posted to Dabong for the first time, his duties being wholly in connection with new village agricultural services.

Group Settlements.

From Selangor, the following report has been received from the State Agricultural Officer:-

"*Special Constables.* Progress in the large group scheme at Kampong Traill (Bukit Badong) has been good, and there is every hope that this will develop into a really flourishing community. 180 Special Constables and their families are now in occupation of land; there is room for 300. The first 50 houses have been erected on contract and there is no doubt that the appearance of the houses has acted as a stimulus. The Department maintains a coffee nursery and demonstration plot in the area, and the difficulty experienced lately of obtaining sufficient labour reflects the preoccupation of the Special Constables with work on their own lots. A few men have cleared and planted the whole of their four-acre lots with coffee interplanted with foodcrops; the total area cultivated is estimated at about 250 acres. During the quarter, over 18,000 coffee seedlings were distributed to these men, representing 60 acres planted in the field. As the *kampong* area is opened up, budded fruit trees are being made available.

Assistance by supply of planting material and advice has been given to smaller schemes at Bukit Kuching and Sekinchang in Kuala Selangor; Dengkil, Ulu Langat; Bukit Changgang, Kuala Langat; Jalan Kebun, Klang; and Kuang, Ulu Selangor. At Bukit Changgang, departmental tractors have been used to open up land for coffee and pineapple.

Bukit Bangkong Sakai Reserve. The Agricultural Assistant, Kuala Langat, has made a concentrated effort in this place over the last three years with very striking results. An area of 25 acres of *lalang*-infested land has been converted into a first class coffee area. Further areas of abandoned *lalang* are now being taken in. A similar effort is now being made at Olah Lumpit, in another aboriginal reserve, and progress is being watched with interest."

Agricultural Education.

Courses of instruction were held at Departmental rural training centres in Kedah, Perak, Selangor, Negri Sembilan and Pahang. In Pahang, a new Agricultural Training Centre was opened at Pekan in February by His Highness the Sultan. Mr. G. W. Nye, Deputy Agricultural Adviser to the Secretary of State for the Colonies, was also present at the opening ceremony.

The State Agricultural Officer, Selangor, reports on agricultural education in his State as follows:-

"*Courses.* One Agricultural Assistant is now engaged full time conducting courses at Cheras Agricultural Station. The present series of courses, which has been planned to continue throughout the year, concentrates on the youth of the rural areas. Boys who have recently left Malay schools, and for whom there is little possibility of obtaining salaried employment, are taken from each District in turn and given

an 11-day course in general agriculture. The boys are taken from a small area, e.g. a village, with the hope that by concentrating in this way we shall be able to follow up in the field and, it is hoped, form, from these youths, the nuclei of Young Farmers' Clubs. A maximum of 15 lads can be accommodated at one time. They are chosen by staff of the Department. There has been no lack of applicants and it has usually been possible to select fairly rigorously. In Kuala Langat for instance, 30 boys from two villages were called to Telok Datoh Agricultural Station and given a two-day "course" by the Agricultural Assistant, as a result of which he was able to select only those who were genuinely interested. The course consists of a series of informal lectures on general agricultural topics and particular crops chosen to suit the needs of different districts, interspersed with practical work on the Station. Two full-day and one half-day excursions are arranged to demonstrate the following:-

Excursion (1) to Batang Kali and return via Setapak visiting a number of replanted holdings: rubber replanting and poultry (a visit is usually made to one of the commercial poultry farms in Kuala Lumpur).

Excursion (2) Ulu Langat Valley: co-operative rubber processing.

Excursion (3) Federal Experiment Station, Jalan Kebun: the work of an experimental station; pineapple and other crops on peat; replanting with crops other than rubber.

In addition to our own staff, lectures are given by officers of the Rubber Research Institute and the Department of Co-operative Development, and by the State Replanting Officer's staff.

It is early yet to say what the results of these courses may be. Certainly the boys have been genuinely interested and appear to have enjoyed themselves, but it is essential to arrange an effective follow up in the field."

In Penang and Province Wellesley, an "Open Week" was held at Agricultural Stations and 1,500 visitors were attracted. This proved so popular with the public that it is intended to hold "Open Weeks" regularly in the future.

A successful "Agricultural Day" was held at Titi Serong Padi Experiment Station, North Perak, and was attended by the *Mentri Besar*. Talks and demonstrations were given by departmental staff and the "Day", which has now become an annual event, was well attended by local cultivators.

In all States and Settlements lectures on agricultural subjects were delivered by all levels of staff at new villages, Civics Courses, Women's Institute meetings, schools, prisons, etc.

Farmers' Registers.

The State Agricultural Officer, Kedah and Perlis, plans to put into operation a comprehensive clip-card system designed to keep checks on all links between the Department and farmers and to ensure that contacts are followed up. In Selangor also, a system of compiling registers of the more progressive farmers has been started with the joint aim of using these farmers

as object lessons to the more backward cultivators and of ensuring continuity of attention by staff of the Department.

Soil Survey.

A comprehensive soil survey of the 320,000 acres of padi land in the coastal belt of Kedah and Perlis was started during the quarter.

The knowledge of the different soil types and of their distribution gained from this survey will enable the Department to make more positive recommendations on the use of fertilisers and improved padi varieties and will greatly assist in the siting of further manurial and varietal test plots on cultivators' padi fields.

This survey has meant the mobilisation of practically the whole of the Extension staff of the Department in Kedah and Perlis, working under the direction of specialist officers of the Research Branch.

Reviews.

COCOA

By D. H. Urquhart, B.Sc. (Agric). Longmans, Green & Co., Ltd., London, W.1. Pp. XIX + 230. Illustrated and Indexed. Price 35 shillings.

It is by a peculiarly happy coincidence that such an excellent book on cacao should be published at a time when commercial planting of the crop in the Federation of Malaya is in its infancy. Furthermore it is most fortunate that the author of this book should be Mr. D. H. Urquhart, whose wide experience of the crop is rightly emphasized by Sir Geoffrey Clay in the foreword.

This work will inevitably become the handbook of Malayan English-speaking cacao planters and it is natural that we should judge it from its local usefulness.

After a short historical introduction there comes an authoritative chapter on the botany of the crop by the late Professor R.E. Baker and this can be recommended as giving the latest information under this head. It should perhaps be noted that the long-established Kampong Criollo trees of Malaya belong to a type unknown in the world's market since their small beans are commercially undesirable.

In the next chapter it is noted that Malaya is climatically suited to the cultivation of cacao but the tables of meteorological data would have been of more local interest had they included rainfall figures from the cacao-growing areas in the British Cameroons where growing conditions appear to be similar to our own.

Professor F. Hardy contributes a thought-provoking chapter on soils and their management and it is here that the importance of protecting soils from exposure to sun and rain is so rightly emphasized. One could wish that more details had been given of chemical composition, and of soil reaction in particular, so that a comparison could be made of good soils in the West Indies with potential cacao-growing ones in Malaya. Certainly the best soils of Trinidad are neutral or only slightly acidic whereas those on which cacao is now being grown in this country are more acid (pH4.0-5.2).

When one searches the book for advice on manuring it comes as somewhat of a surprise to find nothing but general advice on the use of balanced fertilisers and mulches, however sound this may be. It has been found that, in Malaya, phosphate manuring is essential for early growth on granitic soils and it is a little surprising to discover that comparable precise information is not available for cacao soils in other countries. One also misses mention of the interesting Trinidad work on the interaction of shade and the plants' nitrogen requirements.

The practical aspects of cacao planting are covered in a very clear manner in four chapters and planters are well advised to study these with care. The discerning reader will note the sharp difference of opinion that

exists on what is the optimum spacing for the crop. In Trinidad it is claimed that the poorer the soil the wider should be the spacing, whereas in the Belgian Congo it is said that, under poor growing conditions, close spacing is indicated. Certainly it has proved easier to establish cacao on poor soils in Malaya when the initial spacing has been close and this also appears to be the experience of West African smallholders.

In the section on nursery practice it is interesting to note that the author recommends filling baskets with some sub-soil because surface soil alone may be unduly alkaline. This advice is certainly not applicable to Malayan conditions where only top soil should be used, reinforced if necessary with cattle manure and rock phosphate. Similarly, the basket-compost recommended in Appendix IV differs in several respects from that which has given good results in Malaya.

The controversial question of shade is dealt with adequately and established methods in different countries are noted briefly, but one misses any mention of van Beers' lucid paper on Indonesian practice. The summing up in this section may be summarized in the one short sentence:

> "Until such time as scientists are able to give convincing explanations of the various functions of shade the planter will have to take local successful practice as his guide."

The two chapters on pests and diseases will be read very critically by all Malayan planters since the havoc caused by these enemies in established cacao-growing countries is now well known. The question that will spring to every reader's lips will be "which of the more serious of these pests and diseases occur in Malaya and how can the others be kept out?".

The two serious diseases caused by fungi are Black Pod and Witches' Broom. The causal agent of the former is *Phytophthora palmivora*, a fungus which probably occurs in all cacao-growing countries. In the Federation it causes Black Stripe Disease of rubber, which is a minor disease of the tapping panel. However, this particular strain of the fungus has not yet caused Black Pod in the field although symptoms have been produced in the laboratory by inoculation. It seems likely, however, that with normal mutation rates more aggresive strains will inevitably appear and that at some date in the future cacao pods will become infected. However, Black Pod Disease can be controlled by normal estate hygiene and by spraying with copper fungicides.

The fungus which causes Witches' Broom Disease is confined to the New World and there is every reason to suppose that it can be kept out of Asia by efficient plant quarantine regulations.

The most serious insect pests of cacao are undoubtedly the capsids, and *Helopeltis theobromae* is of widespread occurrence in Malaya. This is likely to be the most important insect pest of the mature crop in this country and efficient methods of control have already been worked out by Research Officers of the Department of Agriculture. Fortunately the three other capsids which are of such great importance in West Africa do not occur in South-East Asia and it should be possible to prevent their introduction.

Mealy-bugs and leaf-eating beetles occur in all cacao-growing countries but they are chiefly pests of the young plant and can be controlled quite efficiently, especially when planting under thinned jungle is practised.

It is significant that a whole chapter is devoted to the virus diseases of cacao, this being written in collaboration with Dr. A. F. Posnette, the well-known virologist of West Africa and East Malling. There is no disease of any major crop in Malaya which is of comparable severity with Swollen Shoot Disease of West Africa. It must be kept out of Asia, just as the South American Leaf Disease of rubber must be kept away. This can only be achieved by international collaboration to enforce phytosanitary regulations.

The viruses responsible for Swollen Shoot are indigenous to the forests of West Africa. Are we safe in assuming that the "semper aliquid novae" is confined to "Aethiopia"? What of our own extensive forests? Are they, too, likely to yield virus diseases which one day will attack cacao? Only time will tell, but some optimism in this direction is justified since cacao trees have been in cultivation in Malaya for at least half a century and none of the trees so far examined has shown symptoms of virus infection.

There are other very useful chapters on cocoa grades and grading, research, world production and consumption, rehabilitation and peasant cultivation in West Africa. All these will be of great value to planters and research workers, particularly as selected lists of references are given for each chapter. Equally useful information is given in the eight appendices, that on costs being of particular value to planters while the up-to-date note on micro-fermentation will interest research workers. The short appendix on the preparation of rooted cuttings will be of only limited value in this country and it is somewhat surprising here to note that a 3-ton lorry will take 800 basketted plants. This would certainly not apply to Malayan conditions where, even with crating and double stacking, a load consists of only 230 basket plants.

The whole book is lavishly illustrated with excellent photographs, both in black-and-white and colour, and these are all of interest and many help in interpreting the text. A particular word of praise should be given to the colour plate illustrating sections of cocoa beans as this will help planters new to the crop to detect deficiencies in fermentation.

The book is well bound in strong cloth; it has an attractive dust-cover and is remarkably free from printing errors in the text. The author, the general editor (Sir Harold Tempany) and the publishers can all be congratulated on this publication. It can be recommended to all those interested in cacao and the price is reasonable. We look forward to receiving other volumes in the Tropical Agriculture Series, of which this book is the second to be published.

E. F. A.

A CRITICAL REVIEW OF THE WORLD LITERATURE ON THE LEPIDOPTEROUS STALK BORERS OF TROPICAL GRAMINACEOUS CROPS

By W. F. Jepson, O.B.E., Ph.D. Commonwealth Institute of Entomology, London S.W.7. Pp. vi + 127. Price 15 shillings.

This work can only be described as a masterpiece of condensation, covering as it does practically all aspects of the problems associated with lepidopterous borers of gramineous crops grown in the tropics. The treatment is comprehensive, yet free from all extraneous matter. It is a work which should be in the possession not only of all entomologists concerned with these crops, but of all scientists connected with planning ways and means of increasing production of tropical cereals.

Three useful tables enable the reader to see at a glance what insects are associated with what crops, the alternative host plants, where these are of any economic importance, the geographical distribution of the pest, the authority on which the information is based, and the essential bionomic data concerning the various species so far as these are known.

A fourth table, showing the more important parasites, their hosts, and their geographical distribution, might with advantage have been added.

Certain changes of name have been adopted, those which concern us in Malaya being the substitution of *Chilotraea polychrysa* (Meyr.) for *Proceras polychrysus* (Meyr.), originally described by Meyrick in the genus *Diatraea*; and *Proceras sacchariphagus* Bojer for our local cane borer, which had previously been identified as *Diatraea venosata* Wlk. Our maize borer, known as *Pyrausta salentialis* (Sn.) until about 1946, when doubt was cast on its specific status and it was regarded as at most a variety of *P. nubilalis* Hbn. (the European Corn Borer), a view with which we have never agreed, appears now to have been accepted as a valid species under its earlier name. The changes in generic names are discussed in Section 2.

In discussing climatic factors the author includes Malaya in the rainfall range of 50 to 75 in. (p.44), though the higher figure quoted is actually nearer the lower limit of rainfall in Malaya. A range of from 75 to 125 in. would more nearly represent local lowland conditions.

The section on population estimation and assessment of damage (pp.47 to 57) serves to emphasise how little is known about either of these important subjects. The proposition put forward in the final paragraph of this section, namely the growing of infested and uninfested crops side by side, involves a number of practical difficulties. The author himself draws attention to one such difficulty on p.104 where he instances the swamping of experimental plots after treatment by a large invasion from adjacent plots resulting in the treated plots showing a smaller decrease in insect population than the untreated plots. The present writer has experienced much the same thing.

A considerable amount of space is devoted to the important subject of parasites. Opening with a discussion on assessing the value of parasites

and distinguishing between "total real mortality" and "apparent mortality", the author considers the more important parasites, grouping them under egg, larval and pupal parasites. Here we run into a certain amount of difficulty. The treatment of the Scelionidae (pp.69 to 71) leaves the reader under the impression that *Telenomus beneficiens* (Zehnt.) has a wide range of hosts, but Nixon (*Ann. Mag. Nat. Hist.*(tenth series) Vol. 20, 1937, pp.444—480 (p.467)) expresses the view that this species is confined to *Proceras sacchariphagus*. This important paper by Nixon appears to have been overlooked and is not listed in the references.

An apparent discrepancy also occurs in this section: it is stated on p.70 that records of *Platytelenomus hylas* are confined to *Sesamia cretica*, but on p.71 *Sesamia calamistis* and *Autographa chalcites* are also given as hosts.

The last section of this work, consisting of 29 pages, deals with control measures and recommendations for future research.

The suggestion that there should be closer co-operation in the exchange of information between research workers, and better co-ordination between research projects in the various territories concerned is one which deserves close attention. A very important point which does not yet seem to have been fully appreciated is that research into problems of this nature necessarily involves long term projects, and those working on them should not be diverted to other investigations.

In conclusion, while some criticisms may have been voiced, these in no way detract from the value of this publication, which should receive the most careful attention from all those planning research in connexion with the cultivation of rice and other gramineous crops in the tropics. The author is to be congratulated on filling a long felt need.

H.T.P.

General Notes.

A VISIT TO MALAYA BY THE DEPUTY AGRICULTURAL ADVISER TO THE SECRETARY OF STATE FOR THE COLONIES

Mr. G. W. Nye, C.M.G., O.B.E., the Deputy Agricultural Adviser to the Secretary of State for the Colonies, visited the Federation of Malaya from the 22nd January to the 15th February, 1955, to study agricultural developments in the territory.

Mr. Nye had a comprehensive itinerary which included visits to all States and Settlements together with discussions with His Excellency the High Commissioner, the Member for Natural Resources, officers of the Departments of Agriculture and Drainage and Irrigation, State and Settlement authorities and other leading persons connected with agriculture in Malaya.

The first part of Mr. Nye's tour lasted eight days when, with the Acting Director of Agriculture, he visited the States on the west coast north of Kuala Lumpur, together with Penang and Province Wellesley. In Kedah and Perlis, the States which account for more than 40 per cent of the wet padi grown in the Federation, Mr. Nye saw the main crop being harvested, the double cropping areas at Yen, the Kubang Pasu area of more than 100,000 acres which is being developed as a padi irrigation scheme by the Drainage and Irrigation Department, and the experiment stations of the Department of Agriculture where work is in progress on padi, cacao, citrus and other crops and livestock. In Penang, Mr. Nye inspected the Chinese-owned fish-cum-pig farm, and in the Province he saw double-cropping padi areas and the development of vegetable growing in and around new villages. This section of Mr. Nye's visit ended with a tour of Perak where he again saw large areas of padi, at a less advanced stage of growth than in Kedah, the experiment and extension stations of the Department, the Rural and Industrial Development Authority's Mechanical Training School and the Veterinary Research Institute. After a short visit to Cameron Highlands to see the Federal Experiment Station, tea estates and market gardens, Mr. Nye returned to Kuala Lumpur on the 30th January.

At this stage of his tour Mr. Nye visited the research laboratories of the Department, the Federal Experiment Station at Serdang and the College of Agriculture.

The Acting Chief Field Officer accompanied Mr. Nye on a seven-day visit to the east coast States of Kelantan, Trengganu and Pahang. In Kelantan, Mr. Nye was able to study developments in the Department's attempts to encourage the use by padi planters of a tried and proved fertiliser, and saw the dry padi experiment station at Melor, the Salor Irrigation Area and grazing reserves. In Trengganu, he saw and was impressed by the results of the Department's experiments in cacao growing, and visited the only cacao estate in the Federation. The visit to Pahang lasted two days, in which

time Mr. Nye saw the proposed cacao development area at Bukit Goh and studied the extension activities of the Department. Also, while in Pahang, he saw the progress made in regard to general agricultural education, and was present when His Highness the Sultan opened a new school at Pekan Agricultural Station.

Back in Kuala Lumpur, Mr. Nye visited the laboratories of the Rubber Research Institute and the Institute's experiment station at Sungei Buloh. One day was spent on a flying visit to South Perak to see estate cultivation of oil palms and coconuts. Also, Mr. Nye visited the Federal Experiment Station at Jalan Kebun, Selangor, where he saw some of the Department's work on pineapples and coffee and on the general management of peat soils.

The last four days of Mr. Nye's visit were taken up by tours of Negri Sembilan, Malacca and Johore, on which he was accompanied by the Acting Director. Mr. Nye saw rubber replanting activities, pig stud centres, experiment and extension activities of the Department, the Johore coconut belt and the growing and canning of pineapples.

After his visit to the Federation, Mr. Nye toured Singapore, British territories in North Borneo, and Brunei.

THE AGRICULTURAL TRAINING SCHOOL, PEKAN, PAHANG

BY

H. M. James, m.c.,

State Agricultural Officer, Pahang.

An important aspect of the work of the Department of Agriculture is to persuade the farming community to adopt improved technical methods. There is no single road leading to the successful achievement of this aim and it is necessary continually to review and extend the ways and means by which progress can be maintained.

In the State of Pahang, the extension services of the Department have been built up to provide the farmer with the means of improving his knowledge. There has long been established a series of agricultural stations and demonstration plots. The field advisory service is so organised that every *kampong** receives regular visits from a trained Agricultural Assistant. Rubber clonal stumps, budded fruit trees and selected padi seed are produced and sold at cost to meet, as far as possible, all demands. Within the past three years, in response to requests, short courses on various agricultural matters, lasting several days, have been given at a number of centres, but until recently the scope of such courses has been limited by the lack of a residential hostel. The opening, by His Highness the Sultan of Pahang, on the 7th

* A village.

PLATE I.

Budgrafting rambutans. A classroom lecture in progress.

PLATE II.

Budgrafting rambutans. Practical work in progress.

PLATE III.

A demonstration copra kiln. Practical work in progress.

PLATE IV.

A demonstration rubber smoke house. Inspecting smoked sheets.

February, 1955, of the Agricultural Training School at Pekan marks a considerable advance in the facilities offered by the State for the agricultural training of local farmers.

The Agricultural Training School originated as the result of a grant from the Rural and Industrial Development Authority, which provided $30,000 to cover the capital cost of the buildings. The main building consists of a mosquito-proofed dormitory and a large adjoining room, subdivided by partitions into three, serving as a dining room, classroom and library. Connected to the main building are the kitchen and bathrooms, the whole being designed to provide for 20 trainees at a time.

The school is situated at the Pekan Agricultural Station, which was established over thirty years ago. The Station covers an area of 15 acres and contains demonstration and experimental plots which provide a fair cross section of the agriculture and livestock of the riverine and coastal districts. In order to round off these educational facilities, the out-buildings provided with the school consist of a rubber factory and smoke house, a copra kiln, an additional potting shed and a tool shed. These buildings and the equipment provided are relatively inexpensive and suitable for *kampong* use.

The type of training to be given will undoubtedly evolve over the years, but initially it is intended to hold a series of courses of 14 days duration each. It is intended to invite trainees for each course from one particular locality only and to limit the age group to between 25 and 35 years. Each trainee will be a farmer, whose intention it is to remain farming and whose object in attending the course is to improve his knowledge of his trade. It is believed that a greater value will be given to these courses if the trainees are drawn from the same locality, since a group, rather than a thin sprinkling of individuals, would have more incentive to bring improved methods into practice. Furthermore, there is the possibility that the group may form the nucleus of an agricultural association which would make follow-up operations considerably simpler and more effective.

The first course lasted from the 7th to the 20th February, 1955. Being of only 14 days duration, it required careful planning, but the task was possible since the trainees had all had years of farming experience within the same area and there was not too great disparity between ages. The main cash crop, rubber, was covered in some detail, talking points being the use of improved planting material, the budding operation and the production of good quality smoked sheet. The method of instruction was based on a short talk, followed by a demonstration and then practical work carried out by the students themselves. Similarly, the more important aspects of fruit and vegetable growing and copra production were dealt with. Care was taken to avoid anything considered by the trainees to be tedious, with the result, for example, that the *changkol* (hoe) was kept largely in the background and the budding knife used to the full. Apart from the set subjects of the course, the students were able to see a number of agricultural activities demonstrated on the Station, such as poultry, goat, cattle and fish rearing, cacao growing in association with durians, pepper cultivation and green manures.

A friendly atmosphere existed during the course between the staff and the trainees. In charge was Che' Yusoff bin Din, an Agricultural Assistant, who has served in the Department of Agriculture in Pekan since 1949 and is a well known personality in the District. Wan Abdul Aziz, the Assistant Agricultural Officer, East Pahang, with nearly 20 years service, largely in Pekan, behind him, designed the course and took a leading part in lectures and practical work. Che' Ahmad bin Abdul Ghany, an Agricultural Assistant recently posted to Pekan, also took part, and much of the practical work was arranged by Che' Mohd. Ali, Junior Agricultural Assistant, Pekan Agricultural Station. A Junior Rubber Instructor of the Smallholders Advisory Service of the Rubber Research Institute of Malaya, Che' Mohd. Noh bin Hussein, took charge of the rubber factory and smoke house operations. The successful management of the course was in great measure due to the firmly established reputation that the Department of Agriculture has established in Pekan District and to the personal contact already made by the members of the staff with most of the trainees long before the course started.

When the course ended, each trainee had budded 100 rubber and 50 fruit tree stocks, had prepared good quality copra and good quality smoked rubber sheet. He had planted and looked after clonal rubber seed, fruit trees, vegetables and green manures, taken part in debates on agricultural problems and listened to explanations of the fundamental principles of agriculture. On leaving, he was given a questionnaire asking for his opinion of the value of the course and seeking his co-operation in improving the subject matter of future courses. The follow-up operation will have the immediate object of ensuring that all seedling rubber of suitable age in the *mukim**, totalling several hundred acres, is budded. If this is successfully carried out, a great deal will have been accomplished.

In the future, the programme calls for one course to be held each month.

---

* A parish.

Departmental Notes

Obituary.

It is with sincere regret that we record the deaths of Wan Ibrahim bin Wan Sulaiman, Agricultural Assistant, Pasir Mas, Kelantan, who died on the 17th January, 1955, and Che Shafie bin Mohamed Taib, Agricultural Assistant, Province Wellesley South, who died on the 24th January, 1955.

Wan Ibrahim was 30 years of age when he died. He was born in Kuala Krai, Kelantan, and educated at the Penang Free School. He successfully studied for the Diploma in Agriculture at the College of Agriculture, Malaya, from 1947 to 1949, and was appointed as an Agricultural Assistant in the Department of Agriculture, Kelantan, immediately afterwards. Most of his service was spent in the furtherance of agricultural improvement in Pasir Mas District—a task to which he devoted himself with energy and considerable success, in spite of the handicap of chronic illness for many months before his untimely death.

Wan Ibrahim was held in high regard by a wide circle of farmers, colleagues and friends in all walks of life; he will long be missed by all of them.

Che Shafie joined the service in 1926 and served in Federal Headquarters and at the Federal Experiment Station, Serdang, until 1947. He then served as Agricultural Assistant, Province Wellesley South, Nibong Tebal, until the time of his death.

He was a pleasant and likeable officer and it is to his special credit that he carried out his duties faithfully in the face of hardships caused by prolonged illness.

Che Shafie was 47 at the time of his death and leaves a widow and four children.

Retirement of Mr. J. R. Curry.

Mr. J. R. Curry, Chief Field Officer, and, since the proceeding on leave prior to retirement of Mr. O. J. Voelcker, C.B.E., Acting Deputy Director, left on retirement leave on the 11th April, 1955.

Mr. Curry, after six years farming experience in the United Kingdom, became a Colonial Agricultural Probationer in 1928. He was posted to Tanganyika as an Agricultural Officer in 1930 and served in succession in the Central, Northern and Lake Provinces until 1942. In that year, he was seconded to the Bahamas as Director of Agriculture. In April, 1946, he came to Malaya as an Agricultural Officer. He was promoted to Senior Agricul-

tural Officer on the 28th November, 1946, and to Chief Field Officer on the 29th February, 1952. Prior to coming to Headquarters in 1952, he served in Selangor, Negri Sembilan and Pahang, in each case as State Agricultural Officer, and also acted as Principal, College of Agriculture.

John, as he was known to all and sundry, had probably the most practical approach of any member of the Department to the agricultural problems of the country. This can doubtless be accounted for by his unusually long pre-service farming experience. On the other hand, there were occasional manifestations of the philosophical approach. In general, however, he mistrusted the, to him, over-scientific treatment of a problem and was often prepared to back his judgement, based on wide experience and the simpler forms of experimentation, against the findings of the multi-factorial experiment as applied by the statistical fraternity.

He was the senior bachelor of the Department, a lover of the good things of life, a *gourmet* of repute, a friend of the arts, well read and informative, and the most genial and generous of hosts.

We wish him a long and happy retirement, if indeed he really means to retire; if not, success in whatever venture he may undertake.

R. G. H.

Conferment of Title.

His Highness the Sultan of Pahang has been graciously pleased to confer the title Orang Kaya Indera Pahlawan on Wan Abdul Aziz bin Ungku Haji Abdullah, Assistant Agricultural Officer, Pahang East.

Appointments.

The Right Honourable the Secretary of State for the Colonies has appointed Mr. F. N. G. Conaty to be Canning Officer, Malayan Agricultural Service, with effect from the 18th March, 1955. Mr. Conaty arrived in Malaya on the 10th April, 1955.

Mr. J. Cook, Senior Agricultural Officer and Acting Chief Field Officer, was appointed to act as Deputy Director of Agriculture with effect from the 12th April, 1955.

Dr. W. N. Scott, Senior Agricultural Officer, was appointed State Agricultural Officer, Perak, with effect from the 25th March, 1955.

Mr. P. G. Coleman, Agricultural Officer, was appointed to act as Chief Field Officer with effect from the 12th April, 1955.

Leave.

The following officers have returned from leave:-

Mr. H. F. Logan, Administrative Officer, on the 3rd February, 1955.

Dr. W. N. Scott, Senior Agricultural Officer, on the 22nd February, 1955.

Mr. P. G. Coleman, Agricultural Officer, on the 8th March, 1955.

Mr. J. A. Cox, Agricultural Development Officer, on the 7th May, 1955.

The officers who have proceeded on leave are:-

Mr. H. J. Simpson, Senior Agricultural Officer, on the 28th March, 1955.

Mr. J. R. Curry, Chief Field Officer, on leave prior to retirement, on the 11th April, 1955.

Mr. I. Watson, Statistician, on the 26th April, 1955.

Resignations.

Dr. G. Youatt, Chemist, resigned with effect from the 4th April, 1955.

Mr. I. Watson, Statistician, resigned with effect from the 26th April, 1955.

MARKET PRICES

January to March, 1955.

Rubber.—In January, the Singapore price of R.S.S. No. 1 was higher than $1 per lb. for the first time since April, 1952. The market opened on the 3rd January with the price at 99.625 cents, but by the 6th it had dropped to 94.25. However, the price recovered slowly and passed the $1 mark on the 20th. The highest price in January was 105.375 cents, on the 28th, and the average for the month was 98.96 cents per lb.

The price remained above $1 per lb. for the first 16 days of February, with a peak of 106.375 cents on the 11th. There was a drop to 90.50 on the 19th and, after a short-lived revival, it was 88.50 on the 25th. The average price for February was 99.11 cents.

There were only six days in March on which the price was above 90 cents, but on most days it was above 85 cents. The average price for March was 88.12 cents per lb.

The prices mentioned above are the noon buyers' prices for rubber f.o.b. in bales, are as reported by the Singapore Chamber of Commerce, and have been taken from the Monthly Statistical Bulletin of the Federation of Malaya.

The average prices paid during the quarter for smallholders' rubber at three centres in the Federation of Malaya are shown in Table I.

Table I.

Average Monthly Prices Paid by Local Dealers for Smallholders' Rubber, January to March, 1955.

(Dollars per picul of 133 1/3 lbs.)

Grades.	Taiping, Perak.			Seremban, Negri Sembilan.			Batu Pahat, Johore.		
	Jan.	Feb.	Mar.	Jan.	Feb.	Mar.	Jan.	Feb.	Mar.
Smoked Sheet No. 1 ..	106.84	106.00	95.21	108.41	107.46	96.35	107.52	106.14	95.26
Unsmoked Sheet ..	90.08	89.37	81.73	87.65	83.07	71.78	94.16	92.82	84.83
Scrap ..	47.98	44.89	46.50	58.03	56.84	50.05	37.00	38.28	35.31

This Table has been compiled from statistics supplied by the Registrar of Statistics, Federation of Malaya.

Tea.—The Registrar of Statistics reports that 983,361 lb. of black leaf of local origin, valued at $2,137,518, was exported during the period under review. Production figures are not available.

The average prices paid for Ceylon teas at the public auctions in Colombo on the 29th March, 1955, as reported in the Weekly Tea Market Report of the Colombo Brokers' Association, were as follows, in rupees per lb:—High Grown Teas 1.93, Medium Grown Teas 1.75, and Low Grown Teas 2.03. No sales of Malayan tea in Colombo have been reported during the quarter.

Palm Oil.—The average prices, in dollars per ton, paid in London for Malayan palm oil were:—January 608.57, February 640.71, and March 653.57.

Derris.—The price of this commodity remained at $110 per picul during the quarter.

Table II.

Singapore Prices of Various Agricultural Products.

(Dollars per picul)

Date	Copra, Sundried	Coconut oil*	Pepper, F.A.Q. Muntok white	Pepper, Gen. Muntok white	Gambier, Cube	Sago Flour, Lingga	Tapioca Flour No. 1	Oilcake, Round
1955								
3rd Jan. ..	31.00	30.50	216.50	226.50	41.00	12.50	16.25	17.00
10th Jan. ..	31.25	30.75	211.50	221.50	41.00	12.62½	16.25	16.50
17th Jan. ..	31.75	31.25	210.50	220.50	41.00	12.62½	16.25	16.00
27th Jan. ..	31.50	31.00	214.00	224.00	41.00	12.62½	16.25	15.50
31st Jan. ..	31.50	31.00	214.50	224.50	42.00	12.62½	16.25	15.50
8th Feb. ..	31.00	30.50	214.50	224.50	42.00	12.75	16.25	17.00
14th Feb. ..	30.25	29.75	217.50	227.50	42.00	12.75	16.75	16.50
21st Feb. ..	29.25	28.75	213.00	223.00	42.00	12.75	16.75	16.50
28th Feb. ..	29.00	28.50	213.00	223.00	42.00	12.75	16.50	15.00
7th Mar. ..	28.00	27.50	207.00	217.00	42.00	12.75	16.50	15.00
14th Mar. ..	28.25	27.75	207.00	217.00	42.00	12.75	16.25	15.00
21st Mar. ..	29.50	29.00	205.00	215.00	42.00	12.75	16.00	15.50
28th Mar. ..	29.00	28.50	196.00	206.00	42.00	12.75	16.00	15.50

* F.O.B.

The above prices are taken from the weekly reports of the Singapore Chamber of Commerce.

FEDERATION OF MALAYA

PRODUCTION OF PALM OIL AND KERNELS.

(In long tons as declared by Estates)

Month	Palm Oil		Palm Kernels	
	1954	1955	1954	1955
January ..	4,143	4,093	1,139	1,124
February ..	3,908	3,997	1,066	1,081
March ..	4,442	4,854	1,210	1,300
April ..	4,674		1,228	
May ..	5,251		1,396	
June ..	4,188		1,114	
July ..	4,580		1,162	
August ..	4,694		1,236	
September ..	4,319		1,157	
October ..	4,333		1,154	
November ..	4,642		1,273	
December ..	4,776		1,336	
Total ..	53,950	(12,944)	14,471	(3,505)

In March 53, estates were in production out of a total of 60 oil palm estates.

MALAYAN AGRICULTURAL EXPORTS, OCTOBER—DECEMBER, 1954.

Product	Net Exports in Tons.			
	Year 1953	Year 1954	Oct.-Dec., 1953	Oct.-Dec., 1954
Arecanuts	11,580	5,511	4,673	3,278
Coconuts, fresh † ‡ ..	88,315 †	94,433 †	23,356 †	22,624 †
Coconut oil ‡	60,779	78,507	23,350	17,336
Copra ‡	9,751 *	67,472 *	8,693 *	19,828 *
Copra cake	59,129 *	40,520 *	12,801 *	10,378 *
Gambier, all kinds ..	160 *	134 *	84 *	43 *
Palm Oil	47,579	48,908	13,055	10,830
Pineapples, canned ..	17,368	21,533	3,031	3,026
Rubber¶	572,792 ¶	582,991 ¶	149,978 ¶	159,329 ¶
Sago,—flour	28,444	27,980	5,707	6,243
Sago,—pearl	5,896	5,122	1,375	1,732
Sago,—raw	27,246 *	27,021 *	7,136 *	5,231 *
Tapioca,—flake	128 *	49	15 *	83
Tapioca,—flour	7,362 *	4,555 *	1,621 *	1,035 *
Tapioca,—pearl	5,474	7,865	1,773	2,027
Derris	10	16	1	3
‡ Copra equivalent ..	90,781	88,943	29,718	8,795

¶ production (Federation of Malaya). † hundreds in number. * net imports.

FEDERATION OF MALAYA RUBBER PRODUCTION.

(In long tons, dry weight)

Month	Estates		Smallholdings (Estimated)		Total	
	1954	1955	1954	1955	1954	1955
January ..	30,278	29,260	19,014	27,801	49,292	57,061
February ..	25,354	28,497	17,913	20,336	43,267	48,833
March ..	24,556	27,465	17,452	26,620	42,008	54,085
April ..	24,749		15,339		40,088	
May ..	27,572		18,585		46,157	
June ..	26,873		16,236		43,109	
July ..	30,970		22,931		53,901	
August ..	30,826		21,576		52,402	
September ..	30,067		23,371		53,438	
October ..	29,405		20,724		50,129	
November ..	31,798		22,925		54,723	
December ..	30,313		24,164		54,477	
Total ..	342,761	(85,222)	240,230	(74,757)	582,991	(159,979)
Total 1953 ..	341,117		231,675		572,792	

This Table has been compiled from statistics published by the Registrar of Statistics, Federation of Malaya.

Production on smallholdings (estates of less than 100 acres) is taken as the total of purchases from smallholders reported by licensed dealers.

FEDERATION OF MALAYA

PRODUCTION OF COPRA, COCONUT OIL AND COPRA CAKE.

(in tons)

Month	Copra Production						Coconut Oil Production		Copra Cake (Poonac) Manufactured	
	Estates (a)		Smallholdings (estimated)		Total		Oil Mills		Oil Mills	
	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955
January ..	3,123	2,674	9,470	4,297	12,593	6,971	8,837	5,528	5,583	3,561
February ..	2,789	2,797	9,616	8,366	12,405	11,163	7,798	7,753	4,891	4,808
March ..	3,072	2,975	11,482	7,726	14,554	10,701	8,721	7,368	5,487	4,603
April ..	2,993		9,922		12,915		6,961		4,515	
May ..	3,803		10,128		13,931		8,098		5,195	
June ..	3,763		12,175		15,938		8,158		5,181	
July ..	4,112		11,850		15,962		8,582		5,505	
August ..	3,886		11,237		15,123		8,480		5,489	
September ..	3,481		10,631		14,112		8,501		5,403	
October ..	3,069		11,160		14,229		8,014		5,184	
November ..	2,942		8,854		11,796		7,296		4,602	
December ..	2,831		7,770		10,601		7,354		4,533	
Total ..	39,864	(8,446)	124,295	(20,389)	164,159	(28,835)	96,800	(20,649)	61,568	(12,972)

Notes:—1. The above Table has been compiled from statistics published by the Registrar of Statistics, Federation of Malaya.

2. Estate copra production and coconut oil production are as declared by estates and oil mills respectively.

3. Statistics of smallholding coconut oil production are not available.

4. Smallholding copra production for commercial purposes is estimated from the formula: imports + estate stocks (opening) + estate production + smallholding production = exports + local oil mill consumption + estate stocks (closing).

(a) Includes copra equivalent of sales of fresh nuts by estates.

METEOROLOGICAL SUMMARY, MALAYA, JANUARY, 1955.

Locality	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes						Total		Most in a day	Number of days							
	A. Max.	B. Min.	Means of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F			Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more	Total	Daily Mean	Per cent.
										in	mm.	in						hr.	hr.	
Ipoh, Perak ..	91.3	71.2	81.3	96.0	68.2	86.5	74.4			5.20	132.1	1.62	10	9	1			204.75	6.60	
Kuala Lumpur, Selangor	88.5	72.0	80.3	92.2	69.0	82.8	74.8			4.57	116.1	1.67	13	8	4	8				
Sitiawan, Perak ..	87.9	70.8	79.3	90.9	67.8	85.5	73.6	82.5	83.5	9.58	243.3	1.78	16	14	8	1		200.95	6.48	
Kuantan, Pahang ..	82.2	71.1	76.7	89.3	64.8	77.5	73.3	78.1		11.41	289.8	1.86	28	26				109.55	3.53	
Bayan Lepas, Penang ..	89.4	73.5	81.5	92.3	69.4	87.0	77.2			0.03	0.8	0.03	1		2			239.95	7.74	
Malacca ..	85.6	71.7	78.7	90.6	67.0	76.0	74.7			4.19	106.4	1.18	17	11				164.50	5.31	
Mersing, Johore ..	81.0	72.9	76.9	88.3	67.3	77.0	76.4			20.04	509.0	4.16	27	24			11	122.20	3.94	
Alor Star, Kedah ..	87.7	70.7	79.2	92.1	66.0	80.8	74.2			1.07	43.2	0.70	6	4				234.30	7.56	
Kota Bharu, Kelantan ..	82.2	73.5	77.9	85.5	68.2	77.1	76.6	79.2	81.8	12.12	307.8	6.50	17	14	2	1		138.40	4.46	
K. Trengganu, Trengganu	81.3	72.9	77.1	85.0	68.2	77.5	74.7			3.46	87.9	0.52	18	4				126.30	4.07	
Kallang Aerodrome (S'pore)	85.2	73.3	79.3	89.0	71.0	77.3	75.7			21.61	548.9	4.15	23	19	2		2	141.60	4.57	
HILL STATION.																				
Cameron Highlands, Tanah Rata, Pahang. (4750 ft.)	69.3	58.3	63.8	74.0	48.0	65.0	62.0			2.88	73.2	0.52	19	15				131.55	4.23	

Compiled from Returns supplied by the Malayan Meteorological Service.

METEOROLOGICAL SUMMARY, MALAYA, FEBRUARY, 1955.

Locality	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall									Bright Sunshine		
	Means of			Absolute Extremes								Most in a day	Number of days								
	A. Max.	B. Min.	Means of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F	Total		Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more		Total	Daily Mean	Per cent.
										in	mm.	in							hr.	hr.	
Ipoh, Perak ..	93.6	72.4	83.0	96.7	70.0	89.6	75.0			4.85	123.2	2.01	10	7	1				212.15	7.58	
Kuala Lumpur, Selangor	90.9	72.7	81.8	93.2	69.4	87.4	75.0			7.35	186.7	2.41	15	13	7	9					
Sitiawan, Perak ..	89.4	72.1	80.7	92.0	68.3	86.5	74.2	84.3	84.7	1.29	32.8	0.61	10	8	3				212.50	7.59	
Kuantan, Pahang ..	86.1	70.3	78.2	88.6	67.0	79.0	73.9	80.0		1.68	42.7	0.70	9	7		1			190.15	6.79	
Bayan Lepas, Penang ..	89.5	73.7	81.6	94.0	71.6	86.3	76.3			3.13	79.5	1.11	9	9	1				239.40	8.55	
Malacca ..	89.5	72.7	81.1	93.0	70.1	85.0	75.0			1.79	45.5	0.70	9				1		207.40	7.41	
Mersing, Johore ..	83.7	73.6	78.7	86.6	68.4	80.2	76.6			0.64	16.3	0.38	5	2			2		211.15	7.54	
Alor Star, Kedah ..	92.7	70.5	81.6	95.8	67.2	88.8	76.0			3.72	94.5	2.44	5	4	2				249.25	8.90	
Kota Bharu, Kelantan ..	85.5	71.3	78.4	87.9	67.3	82.9	78.8	83.5	84.0	0.41	10.4	0.32	5	2		12			245.40	8.76	
K. Trengganu, Trengganu	84.3	71.5	77.9	86.2	67.8	82.0	75.6			0.42	10.7	0.20	3	3		7			241.35	8.62	
Kallang Aerodrome (S'pore)	88.9	74.1	81.5	91.3	72.0	83.6	76.0			2.26	57.4	0.95	9	6			1		178.50	6.37	
HILL STATION.																					
Cameron Highlands, Tanah Rata, Pahang. (4750 ft.)	73.3	53.7	63.5	78.0	45.0	67.0	60.0			3.08	78.2	1.49	8	8					161.50	5.76	

Compiled from Returns supplied by the Malayan Meteorological Service.